Right Energy Partnership with Indigenous Peoples

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ADVANCING INDIGENOUS-LED ENERGY SYSTEMS:

UNDP-GEF-SGP and REP Partnerships

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CONTENTS

Executive Summary — i

Introduction — iv

List of Acronyms — v

Cambodia — 1

Cameroon — 13

Democratic Republic of the Congo — 35

El Salvador — 41

Honduras — 55

Nepal — 65

Timor-Leste – Covalima — 81

Timor-Leste – Manatuto — 91

Key Achievements — 103

Overall Impacts — 104

Challenges — 105

Ways Forward — 106

Conclusion — 106

EXECUTIVE SUMMARY

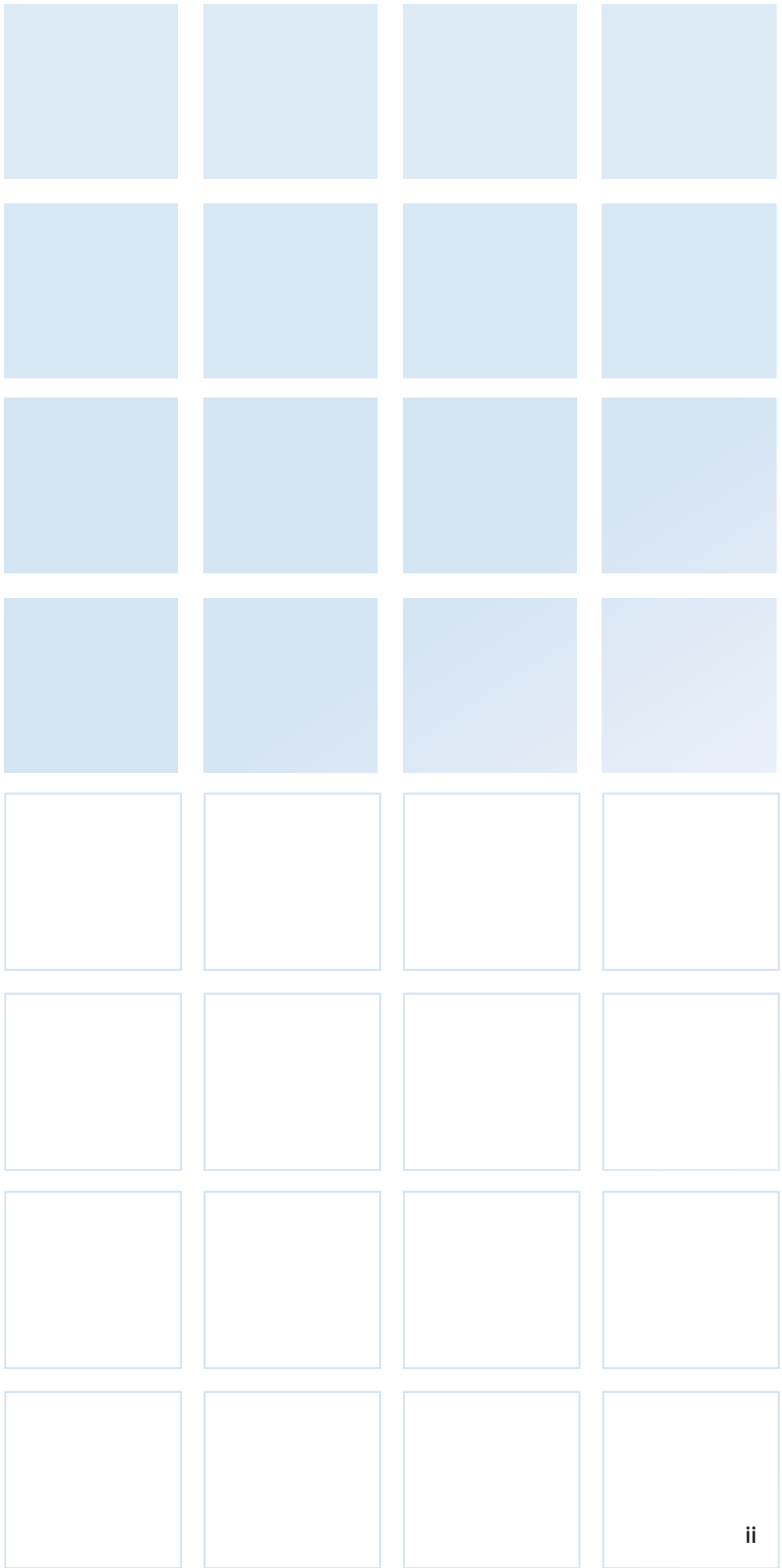
Indigenous Peoples face disproportionate energy access, hindering progress toward the Sustainable Development Goal 7. The Right Energy Partnership (REP) with Indigenous Peoples, guided by international human rights standards, addresses these challenges. Partnering with the UNDP GEF Small Grants Programmes across seven countries, the REP aims to provide access to renewable energy to 50 million Indigenous peoples by 2030, respecting their rights and aspirations.

The initiatives in Cambodia, Cameroon, DR Congo, El Salvador, Honduras, Nepal, and Timor-Leste showcase significant achievements. Notable impacts include improved access to essential services, better health and well-being, empowerment of marginalized groups, environmental benefits, economic diversification, and enhanced education. These projects foster community cohesion and cooperation, advance gender equality, and contribute to disaster readiness, exemplifying the transformative potential of sustainable energy in Indigenous communities.

However, challenges persist. Capacity building, maintenance issues, lack of guidelines, equipment availability, limited capacity, sustainability concerns, and crucial lessons learned highlight the complexities of Indigenous-led energy projects. Addressing these challenges requires a comprehensive approach, encompassing self-determined development, government support, cost reduction, holistic community support, targeted initiatives for Indigenous women, environmental conservation integration, involvement of traditional leaders, and community-led governance.

Moving forward, the promotion of self-determined development, government support, cost reduction measures, comprehensive community support, targeted initiatives for Indigenous women, environmental conservation integration, involvement of traditional leaders, and community-led governance committees are crucial. These strategies aim to empower Indigenous communities, ensure cultural relevance, and sustainably advance renewable energy access.

In conclusion, the collaborative efforts of REP and UNDP GEF Small Grants Programmes exemplify a commitment to empower Indigenous peoples and drive positive change through renewable energy. Adhering to human rights principles and fostering sustainable development, this partnership serves as a model for inclusive, transformative energy solutions, demonstrating the potential to uplift Indigenous communities worldwide.



INTRODUCTION

Indigenous Peoples, comprising only 5% of the global population, account for one-third of the 900 million extremely impoverished individuals in rural areas. Ensuring access to energy for indigenous communities is crucial for achieving Sustainable Development Goal 7 (SDG 7), which aims to provide universal energy access. Unfortunately, Indigenous Peoples often remain overlooked in energy access discussions, leading to insufficient data and inadequate attention in major SDG 7 reports. Furthermore, renewable energy projects in Indigenous territories frequently disregard Indigenous rights, resulting in conflicts, displacement, and rights violations.

To address these challenges, aligning energy initiatives with international human rights laws and norms, such as the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) and ILO Convention No. 169, is essential.

The Right Energy Partnership (REP) with Indigenous Peoples

Recognizing the unique challenges faced by Indigenous communities, the Indigenous Peoples' Major Group on the SDGs is leading the Right Energy Partnership (REP) with Indigenous peoples.

This partnership has two primary goals:

1. Ensure that renewable energy projects respect and protect human rights.
2. Provide renewable energy access to at least 50 million Indigenous Peoples by 2030, aligned with their self-determined development needs and aspirations.

These objectives are pursued through the following strategies:

1. Protecting Indigenous rights to prevent adverse impacts of renewable energy development.
2. Empowering Indigenous communities in self-determined sustainable development, including equitable access to renewable energy.
3. Facilitating knowledge exchange, solidarity, and collaboration between Indigenous peoples and other stakeholders to advance partnership objectives.

Advancing a Rights-Based Partnership

To facilitate renewable energy access for indigenous peoples, REP has partnered with the UNDP GEF Small Grants Programmes in various countries, including Cambodia, the Democratic Republic of Congo, Cameroon, Nepal, Timor Leste, El Salvador, and Honduras. Projects in these regions aim to provide tailored renewable energy solutions.

The results of the projects are presented below.

LIST OF ACRONYMS

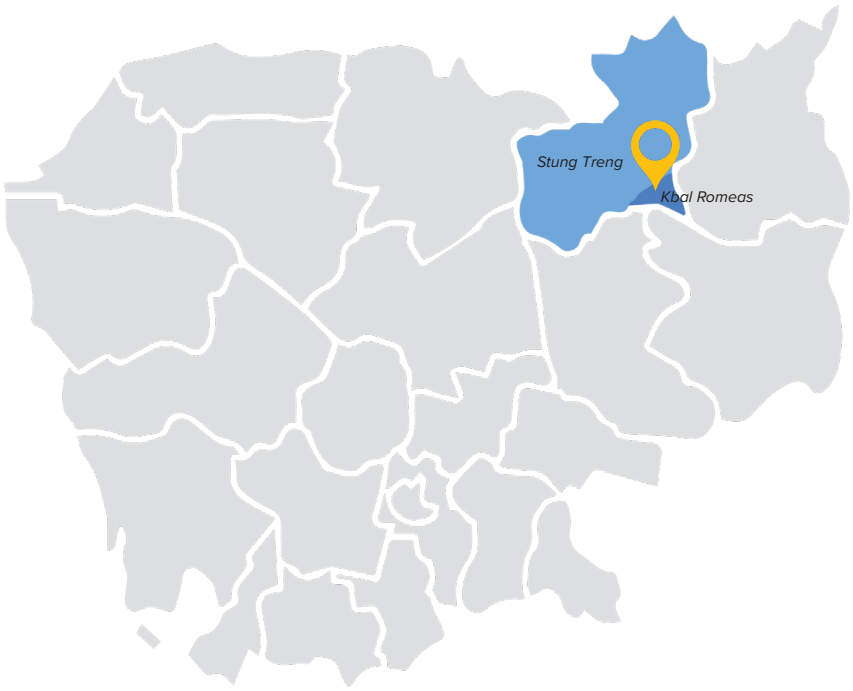
ADEPA	Association for the Development of the Pygmy Peoples of Africa
AFPB	Association des Femmes Pygmées Botshike
AMCH	Community Media Association of Honduras
APF	The Parents' Association
APPB	Association des Femes Bokatola
APPL	Association des paisans pygmées de Lokuku
ASD	Association for Sustainable Development
ASSID	Association Santé et Innovations pour le Développement Durable
CABEI	Central American Bank for Economic Integration
CCC	Centro Comunidade Covalima
CCNIS	Salvadoran National Indigenous Coordinating Council
CICA	Central American Indigenous Council
CINPH	Indigenous Coordinator of Popular Power of Honduras
CIPO	Cambodia Indigenous Peoples Organization
COVID-19	Coronavirus Disease 2019
CRC	Committee for Resolving Compensation
DIPY	Dignité Pygmée
DRC	Democratic Republic of Congo
ECLAC	Economic Commission for Latin America and the Caribbean
ENEE	National Electric Power Company
ESCENICA	El Salvador Cultural Association for the Performing Arts
FCFA	Central African CFA Francs
FONDAF	Foyer de Notre Dame de la Foret
FPIC	Free, Prior, and Informed Consent
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IDB	Inter-American Development Bank
ILO	International Labour Organization
INR	Indian Rupee
IPMG	Indigenous Peoples Major Group
IPs	Indigenous Peoples
KfW	KfW Bankengruppe
LAC	Latin American and Caribbean
LED	Light-emitting Diode

LPG	Liquefied Petroleum Gas
MADAKSON	Madaki and Son Cattle Breeders' Group
MBOSCUDA	Mbororo Social and Cultural Development Association
NAMA	Nationally Appropriate Mitigation Actions
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contributions Action Plan
NGO	Non-Govermental Organizations
NPR	Nepalese Rupee
NSC	National Steering Committee
OKANI	Association OKANI
OP6	Operational Phase 6
PLANPIES	El Salvador National Action Plan for Indigenous Peoples
PPD	Programa de Pequeñas Donaciones
PV	Photovoltaic
RDS-Hn	Red de Desarrollo Sostenible de Honduras
REAP	Renewable Energy Action Plan
REMP	Rural Electrification Master Plan
REP	Right Energy Partnership with Indigenous Peoples
REPALEAC	Sustainable Management of Forest Ecosystems in Central Africa
RWSSH	Rural Water Supply Sanitation and Hygiene
SDG	Sustainable Development Goals
SELAVIP	Servicio Latinoamericano, Africano Y Asiatico De Vivienda Popular Foundation
SES	Social and Environmental Safeguards
SGP	Small Grants Programmes
SGP	Small Grants Program
SLMC	Solar Light Management Committee
SP	Solar Panel
SPFA	Solidarité pour la promotion de la Femme Autochtone
TV	Television
UNAH	National Autonomous University of Honduras
UNDP	United Nations Development Program
UNDRIP	UN Declaration on the Rights of Indigenous Peoples
UNFCCC	United Nations Framework Convention on Climate Change
UNLBSL	Unique Nepal Laghubitta Bittiya Sanstha Ltd.
UNYC Nepal	United Youth Community Nepal
WB	World Bank

CAMBODIA

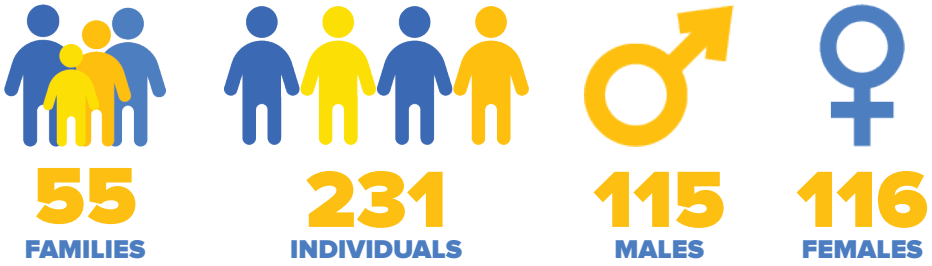
Solar-powered clean water systems

Authors: Dr. Pok Sophak, Dr. Sourn Taingaun, and Mr. Nov Sokhom



1. Background

The **Bunong** Indigenous Community is located along the Srepok River, a tributary of the Mekong River, in the **Kbal Romeas** commune in the Sesan district of the **Stung Treng** province. The community's territory covers approximately 7,800 hectares, including forested areas and flooded village land. There are currently 55 families in the community, equivalent to 231 people, 116 of whom are women. They belong to the Bunong Indigenous community. These communities continue to practice traditions of collective land use. At the same time, individual families own/use a piece of land within the territories claimed by the community.



The primary issue the Bunong community faces is the Lower Sesan II hydropower dam project, which was approved in 2012. The dam was built across the river within the borders of their land. Their old settlement was inundated by floodwater from the dam, hence abandoning their properties and belongings, including houses, burial sites, spiritual grounds, forests, crops, and vegetation.

Following an investigation visit to the dam construction site conducted by the Cambodian National Assembly's Environment Commission in March 2015, the Kbal Romeas community received an official notification about the resettlement process from the Inter-Ministerial Committee for Resolving Compensation (CRC). Other affected villages along the Srepok River have agreed to receive compensation and have left their homes for new settlements prepared by the government. However, the Kbal Romeas Bunong community is the only affected village that refused to relocate to the designated area because it is far from their ancestral land. They wanted to continue living on their ancestral territory, practice collective land use, and preserve their forest, resources, and traditions.

The Bunong community submitted numerous petitions and raised their concerns, which gained attention from both national and international communities. However, their issues remain ignored and unaddressed. The government also failed to provide them with essential fundamental services such as clean water, education/school, health centers, and phone lines. Despite this, they remained hopeful.

The community's refusal to leave their land resulted in multiple intimidation from the government. This includes harassment through the court system and, most importantly, being unable to access essential public services. Contrary to the government's wishes and without formal recognition, the Indigenous community relocated to a higher location near their old villages in 2017 to avoid flooding. Although this has afforded them greater opportunities to connect with their ancestral homes, the Indigenous communities continue to face significant issues.

In December 2018, Cambodian Prime Minister Hun Sen officially unveiled the approximately 11-year-long dam development. The dam gates were closed, and a deluge was on its way. At the same time, Kbal Romeas residents appeared to see the light shining on their land after Prime Minister Hun Sen declared permission for them to dwell in and use their traditional homeland that they had relocated by themselves, which meant that their livelihood would improve.

The community had to rebuild their houses and livelihoods from scratch in the new location. This rebuilding process faced several problems: low food security, lack of clean water, energy, infrastructure, and health care. Additionally, there was the fear of losing their natural resources and the uncertainty regarding their collective land ownership due to overlapping claims by the Siv Gchech Company. The company stated that the community had usurped their land. Building solidarity and unity among their members was the only thing the community could do after their homes were submerged.

The old village flooded by the dam

The new settlement area at the edge of the dam's reservoir

In 2018, community members built a community center that properly fended with Indigenous art and design. In 2019, the government built a school consisting of one building with three classrooms. There are five grade levels (grade 1 to grade 5). Students in grades 1 to 3 study in the morning, while students in grades 4 to 5 study in the afternoon. The government also built a road and two ponds in the community to support their livelihoods.

The community obtained financial resources for its rehabilitation plan through the efforts of the Cambodia Indigenous Peoples Organization (CIPO) and their own determination. Funding from the Servicio Latinoamericano, Africano Y Asiatico De Vivienda Popular (SELAVIP Foundation), and UNDP's Small Grant Program (SGP) substantially improved their living conditions, notably the health and sanitation issues they have faced since relocating. Solar panels and clean water systems were installed to meet their everyday needs. This funding enabled the community to diversify its livelihoods.

Modern Means of Livelihood in the Community

- crop cultivation (paddy rice, upland rice, vegetables, corn, beans, cassava, etc.)
- family-scale fishing (using gillnets and fishing lines)
- collecting non-timber forest products (wild food, rattan, honey, etc.)
- raising livestock (chicken, pigs, cows and buffaloes)
- home gardening
- community-based ecotourism

Community discussion on clean water consumption and solar energy

2. Overview of the REP-UNDP-SGP Project

2.1 Brief Description of the Renewable/Community Energy Project

In the new location, the Bunong Indigenous community in Kbal Romeas comprises 55 families living in 40 houses. Access to clean water was a challenge. Using hand tractors or motorbikes, they had to fetch water from a distant hydropower dam. These modes entail spending hours (an hour or two for hand tractors), labor, and gas money to transport 4-100 liters of water. In addition, the dam's water is not clean and sometimes causes skin rashes. To deal with this water problem, the community members held several meetings and proposed a water distribution system closer to their homes. The community consulted with the CIPO regarding this clean water system initiative. In response, the CIPO supported the community by seeking funding from external sources.

The clean water pumping station project received joint funding from SELAVIP and the UNDP Small Grant Program (UNDP-SGP). The SELAVIP fund contributed to addressing community sanitation by constructing toilets for all households in the village. At first, due to limited funding from SELAVIP, the clean water pumping system used a power generator to pump water, which consumes gasoline fuel. The community then discussed using solar power instead of a generator to reduce costs and protect the environment. The call for a proposal from UNDP-SGP came simultaneously and was accepted. The CIPO outsourced two contractors to install the water distribution system and solar panels two kilometers away from the new settlement.

All community members contributed their labor, ideas, and budget to the project. These contributions include the following:

- attendance to the community meetings
- digging and filling in the ditches
- sourcing/preparing wood for the construction of the clean water station
- building of fences around the station and solar panel

The Department of Rural Development of Stung Treng province supported the technical study and provided advice to the community and contractors during the installation. The Kbal Romeas commune authority recognized and supported the project despite the controversy over the community's refusal to relocate as ordered by the government.

Solar-powered water systems

Water filtration tank

2.2 How is the clean water system managed?

A five-member village committee, including two women (vice chair and treasurer), was formed to manage the clean water system. Its roles are:

- to regularly check the system, including the solar panel farm and pumping system spare parts
- to inform about the temporary suspension of the water supply and any problems, such as pipe break or burst, and then fix it
- to change the sand/gravel in the filtering tank
- to collect water fees based on the amount consumed by households in the community and manage the budget and income to ensure proper water system use

Each house had a water meter installed to measure the water used. The fee is 2000 riels/m^3 (US$0.49). The collected fee is used for system maintenance (e.g., replacing broken pipes, water valves, and other associated costs related to a clean water system, etc.).

Community water source

2.3 Project Results: Benefits of the project to the community

The solar-powered clean water system started operating in 2021. Each of the 44 solar panels has a capacity of 300 watts. The clean water station comprises three concrete tanks and a water tower. The first tank stores raw water directly pumped from the source then flows into the second tank, which acts as a filter containing materials like sand and gravel. After filtration, the water flows into the third tank and is subsequently pumped into the tower.

The water tower can distribute clean water to all 40 households through pipelines. The pipeline from the clean water station to the far end of the community is approximately 3,000 meters. As the water pressure is low, a water pressure booster is used to make the water reach houses in higher areas.

The community uses the water for drinking, cooking, washing, bathing, cleaning animals, and watering plants and vegetables. Since its installation, the clean water system has provided numerous benefits to the community, including the following:

- Saving time and energy by not having to transport water from the dam, allowing them to focus on other work to improve their livelihoods.
- Reduced expenses previously used in manually sourcing water from the dam, hence lower reliance on microfinance loans or bank loans unlike other communities, and increased savings and improved livelihoods.
- Improved academic performance with solar-powered lighting, allowing children to study after dark.
- Improved sanitation and health significantly due to cleaner water for household use. Previously, community folks washed clothes at the dam, making the water unfit for consumption. The issue of skin rashes has also been eliminated.

"Before, I had to transport water by hand tractor from the river polluted by hydropower dam far from the village. It was exhausting, and we spent a lot of money on gasoline. Now, I can save money, and we have time to do other work and protect our forests. My family of two members spends 12,000–20,000 riels/month (approximately US$3-5) on water."

- Lat Mot , 32, small grocery store owner

"As a youth member in the community, I attended meetings about the project with older community members. I helped dig pipeline ditches from the clean water station to houses in the village and fill the pipelines. I also helped prepare the wood for constructing the water station and fence. This clean water supply reduces the expense of using hand tractor fuel to transport water. By not going to fetch water, I now have more time to look after my home, cook, and raise animals. Solar power is a clean energy source and is better than generators that consume fuel. It is cost-effective. People from other villages praised that the clean water system was good and our community was easy to live in."

- Yem Channy, 26

"Before, it was hard to transport water by hand tractor because I am old and all of my children are female. Sometimes, the water storage containers fell off the handed tractor while transporting. It took two to three hours to go to the dam and take water back home. When using raw water from the river, we had a rash and occasionally had diarrhea. Now, I am so happy that we have a clean water supply. Before and during the construction of the water station, I attended several meetings about this project, and my children participated in the construction of the clean water system. We use this water for drinking, cooking, bathing, washing clothes, and watering vegetables. This clean water system has made our life easier."

- Krouch Chanthorn, 76

"The clean water system and solar power really has helped to reduce our difficulty. We do not have to go far away to fetch water from the river anymore. We use this water for drinking, bathing, watering vegetables, etc. I participated in digging pipeline ditches with other community members. Solar power also eases our lives and improves our livelihoods. We only spent money once on installing solar panels, and we can use the energy for many years."

- Kim Dam, 75

"I'm delighted with this clean water and solar energy project because we have clean water and enough energy to use. Now, our community is bright at night. In my opinion, solar energy can save us money compared with other energy sources such as fuel. Solar energy can also save the environment because it does not have smoke, noise, or large impacts like hydropower dams. I am a technician for a clean water system. I regularly check the water system. I can install and maintain solar panels by myself and can help other households when they have an energy problem."

- Lim Phanny, 28 Clean Water System Management Committee Member

The project has made a profound impact on the lives of the locals, especially the women and young girls, by providing them with clean water and solar electricity. They no longer have to spend precious time and money fetching water from distant sources, allowing them to focus on other tasks and responsibilities[1]. These infrastructure projects have led to significant improvements in sanitation and health, with a notable reduction in cases of diarrhea and skin diseases. Furthermore, their children's educational opportunities have improved as they now have better access to light at night for studying and completing homework. The women are genuinely grateful for the support and willingly pay the water fees, recognizing its transformative effect on their lives.

1 https://www.youtube.com/watch?v=wQ56h_L3lxQ

2.4 Productive end-use

The funding from the UNDP-SGP to establish a solar-powered clean water system has substantially improved the community's living conditions and markedly improved the health and sanitation issues they have faced since settling in the new location. Aside from the water system, each of the 40 households in the community was also provided with solar panels to help improve their way of life. The children are now able to perform their academic tasks at night. Furthermore, the development resulted in an improved livelihood—ecotourism. They set up an ecotourism site in the old flooded village, with activities like community forest trekking and viewing over the Mekong River and the flood-floating village. The villagers now have clean water that is safe for consumption and clean toilets for locals and tourists. This development effort is in line with the National Strategy on Rural Water Supply Sanitation and Hygiene (RWSSH) 2011–2025 with five objectives: (i) improving water supply, (ii) improving hygiene, (iii) changing hygiene behavior, (iv) institutional arrangements, and (v) financing. In addition to the national strategy, another funding strategy for the water supply and sanitation sector was developed. This strategy includes a slightly different scenario for rural areas, intending to achieve 100 per cent coverage by 2028[2]. Additionally, the Renewable Energy Action Plan (REAP) and the Rural Electrification Master Plan (REMP) were also formulated[3].

"Solar panels provide clean energy and can save the environment."

A university student tourist from Phnom Penh said, "I came here for field study and tourism. I am very surprised that the community uses solar energy because it is very far from the town. Solar panels provide clean energy and can save the environment. I'm going to stay here for two nights during this trip. I can learn a lot from this community. I think this community is nice because it has enough energy and clean water. I'll advertise this community to others."

A group of eco-tourists having lunch prepared by the community at the community center

2 http://cdc-crdb.gov.kh/en/twg-jmi/sector_strategy/mrd_b_rssw_straigy_Eng.pdf
3 https://www.eria.org/RPR_FY2012_No.26_chapter_7.pdf

Home garden in the village

3. Challenges, lessons learned, and opportunities

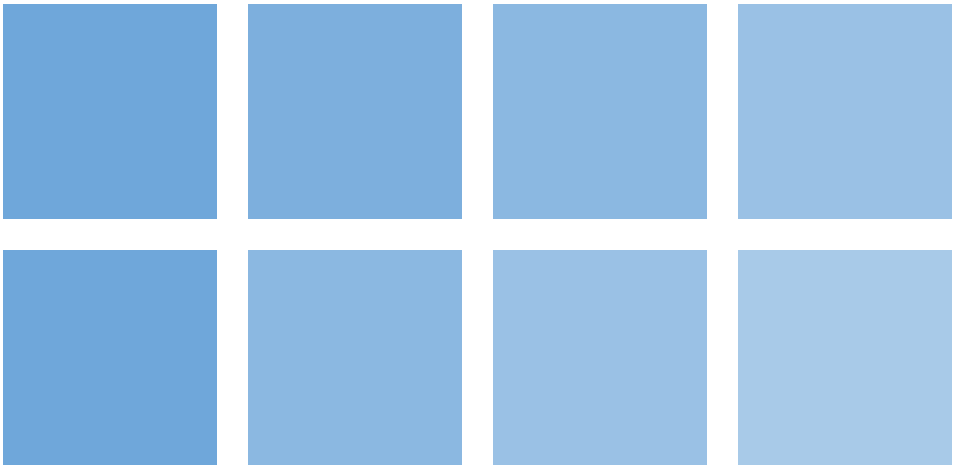
Challenges and solutions

- The community did not know how to install the clean water system. They needed CIPO to facilitate seeking technical assistance from the provincial Department of Rural Development and hiring a company to install it.
- As the community had just restarted their lives after being affected by the hydropower dam and with their livelihoods and houses destroyed[4], they had difficulty accessing basic needs (i.e., food, clean water, settlement) and public services such as electricity, schools, and healthcare.
- Some community members did not want to engage in the project because of distrust of the government and service providers. However, they understood the circumstances and cooperated.
- The plastic pipes were not durable and damaged by heat and water pressure after 7 to 10 months of operation.
- The clean water station is located near the Lower Sesan II hydropower dam reservoir. During the dry season, the water level drops due to increased electricity production for urban areas, causing a water shortage for the station. As a result, they need to extend the pipe to reach areas with available water.
- The minimal fee collected from the 40 households is not enough to maintain the water system. The community continues to find solutions for sufficient funding.
- Some families are unable to pay the water fee on time. Therefore, they sought to understand the reasons and were allowed to pay later.
- Seepage water was found in the third tank.
- The water pressure booster was damaged on 28 April 2022, after four months of use. The contracting company promptly repaired it after the community reported the issue within the guarantee period.

Opportunities

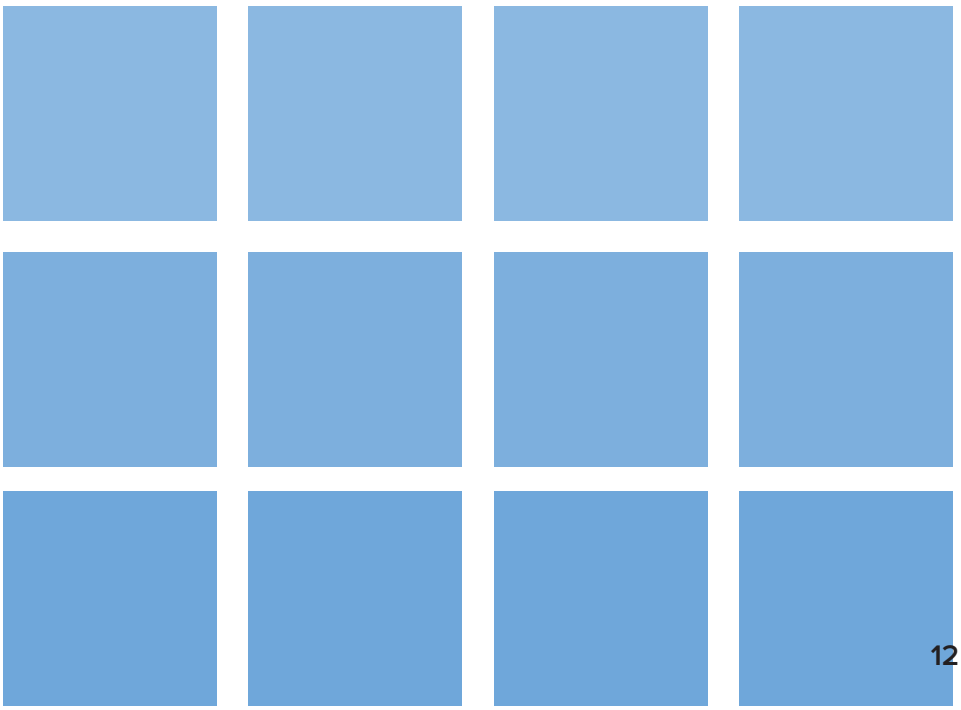
- After receiving the solar-powered clean water system, the community has more time to engage in other income-generating activities. For example, they have started raising livestock and providing community-based ecotourism services. These new opportunities reduced the burden on their livelihoods, allowing them to focus on securing their land claim and collective land registration[5] as their ultimate goal[6].
- In addition to the solar panels used for the clean water systems, the UNDP-SGP fund supported 40 households in installing solar panels in their homes. The electricity produced by the home solar panels accelerates the improvement of the community's livelihood and the children's education. This help somehow gives hope to the community folks amid the challenges.

4 https://youtu.be/LOqMlFkekw0
5 https://cipocambodia.org/customary-land-and-natural-resource-management-and-food-security-of-indigenous-peoples-in-cambodia/
6 https://cipocambodia.org/impactful-project-improves-bunong-livelihood-in-kbal-romeas-village/



4. Recommendations

- The funding for clean water systems powered by renewable solar energy should be extended to other remote and rural Indigenous villages. This system offers clear benefits in quality of life, livelihoods, and environmental preservation, making it a compelling choice.
- To achieve the Ministry of Rural Development's goal of achieving 100 % clean water supply and sanitation services across Cambodia by 2025, implementing community-led clean water systems utilizing solar energy is crucial. The ministry should collaborate with its provincial departments, funders, and communities to install these systems.
- While the community takes the lead in operating this solar-powered clean water system, it is essential for the government to offer technical assistance to ensure its maintenance and long-term sustainability.
- Private sectors should offer comprehensive services that encompass both the construction of clean water stations and the installation of solar panels as a single package, providing a convenient and efficient solution.
- The community's self-determined development serves as an exemplary model for other communities, highlighting the importance of self-reliance. The Ministry of Land Urban Planning and Construction should consider facilitating the community's request for a collective land title, ensuring that their land ownership is as secure as they have rightfully requested ■



CAMEROON

Indigenous-Led Energy Solutions

Author: Dr. Adamu Yusufa

List of Abbreviations and Acronyms

ADEPA	Association for the Development of the Pygmy Peoples of Africa
ASSID	Association Santé et Innovations pour le Développement Durable
DRC	Democratic Republic of the Congo
FONDAF	Foyer de Notre Dame de la Foret
GEF	Global Environment Facility
IPMG	Indigenous Peoples' Major Group
IPs	Indigenous Peoples
MADAKSON	Madaki and Son Cattle Breeders' Group
MBOSCUDA	Mbororo Social and Cultural Development Association
OKANI	Association OKANI
OP6	Operational Phase 6
REP	Right Energy Partnership with Indigenous Peoples
SES	Social and Environmental Safeguards
SGP	Small Grants Program
TV	Television
UNDP	United Nations Development Program
UN SDGs	United Nations Sustainable Development Goals

1. Background

In Cameroon, two major Indigenous communities are the **Mbororo** and the **Pygmies**. The Mbororo pastoralists live in the Savana and Sahel regions, which are ideal for their cattle. They are mainly found in the Northwest, West, East, Adamawa, North, and Far North regions. Two Mbororo communities have benefited from the solar projects, with the **Mbororo Social and Cultural Development Association (MBOSCUDA)** implementing one in **Mobe** in the East Region and **Madaki and Son Cattle Breeders' Group (MADAKSON)** carrying out another in **Yolo** in the West Region. Meanwhile, the Pygmies are hunter-gatherers residing in the forest areas of the eastern, southern, and central regions. Three of these hunter-gatherer communities benefited from the solar energy project. These include the Bakola/Bagyeli in the South region, with the project implemented by the **Association for the Development of the Pygmy Peoples of Africa (ADEPA)**; the Baka in the Messok subdivision; and the Baka community of Assoumindele in the Ngoila subdivision. The two Baka communities are in the East Region of Cameroon.

The appellation *Mbororo* or *Mbororo'en* is used in Cameroon to signify "cattle Fulbe" or "cattle Fulani", who are pastoralists. They comprised three migratory groups or lineages:

- ***Jafun'en***, which means pastoralists Mbororos who own and graze red Fulani cows, settle on highlands in an environment favorable for their cattle and only move down to the lowlands during the transhumance period.
- ***Aku'en*** are cattle herders who move along with their cattle in search of greener pastures. They own white Fulani cows that quickly adapt to the lowlands. They migrate with all their belongings from one country to another without considering national frontiers.
- ***Wodaabe*** are nomads who are cattle herders and traders found in the Sahel area of northern Cameroon.

The beneficiaries of this project are the *Jafun'en* of the West and East regions, referred to as the Mbororo in all the project documents. Even though the word *Mbororo* arose as a derogatory term because it came from the Red Fulani cows called *Mbororoji*, it was re-appropriated to mean positive in 1992 during the creation of the first association of the Mbororo people in Cameroon, the MBOSCUDA.

The Pygmies of Cameroon are forest people subdivided into three sub-groups within the same ethnic group— the Baka, Bakola/Bagyeli, and Bedzang. They are a highly marginalized Indigenous minority group in many development aspects, including access to clean energy. The term *Pygmy* was considered pejorative by the Indigenous community because it was viewed as derogatory or disparaging, describing the short-statured people of the equatorial forests of Africa. Today, the Indigenous forest people have reclaimed the term, giving it a positive meaning. The Pygmies depend solely on hunting, fishing, and gathering as their livelihood activities. They live together with various ethnic groups of Bantu farmers. To a certain extent, they have a positive relationship with the Bantu. Still, they are frequently in conflict because the neighboring Bantu farming community highly marginalizes them. The Pygmies are semi-nomadic; they roam the rainforest for food, taking up temporary residence in areas with rich games and natural resources. It is important to recall that the beneficiaries of this project are the Baka and the Bkola/Bagyeli of the southern and eastern regions of Cameroon.

It should be noted that both the Mbororo and Pygmy communities have been absent in all national discourses or arenas on access to energy. In the areas where this project is implemented, the communities have never had access to either hydro or solar energy, and this is the first of its kind. In fact, these communities have been living in darkness in their respective areas. In the past, they used bush lamps to light their houses in the evening. They set up huge firesides for death celebrations or other ceremonies. They trekked long distances to charge their phones and other electronic gadgets in the city centers.

Five Indigenous Peoples (IP) organizations in Cameroon were selected through a competitive process on community-based projects favoring vulnerable Indigenous Peoples. In all five beneficiary communities, the implementing organizations have finished installing the solar panels, and the projects have been handed over to the management of the communities concerned. Generally, the activities of the different project areas are as follows:

1.1 Sensitization and Information Meetings

All projects for the five IP organizations are solar energy initiatives. Initially, consultation meetings were held to discuss the importance and feasibility of the projects for the communities. Furthermore, there were sensitization sessions on the effects of climate change and meetings to ensure free, prior, and informed consent at the community level. In addition, community members received training in technical skills to manage the solar energy kits and radio kits. They also gained basic knowledge in radio broadcasting using Bakola/Bagyeli languages (specific to ADEPA's project in the Ocean Division) as well as sensitization on the coronavirus. Other stakeholders, such as the government sectoral services and other civil society organizations working with IPs, were involved during this project phase.

1.2. Installation of Solar Panels

One of the main activities of the grant is the provision and installation of solar panels for IPs in rural areas. The five Indigenous communities benefited from the solar panels as follows:

- Assoumindélé (East Region of Cameroon) implemented by Association OKANI
- Mobe (East Region of Cameroon) implemented by MBOSCUDA
- Messok (East Region of Cameroon) implemented by Association Santé et Innovations pour le Développement Durable (ASSID)
- Yolo (West Region of Cameroon) implemented by MADAKSON
- and Kouambo, Foyer de Notre Dame de la Foret (FONDAF), and Deux Ponts in Bipindi, Ngoyang, and Lolodorf Centre in Lolodorf (South Region of Cameroon) implemented by ADEPA.

Access to solar panels helps improve the living conditions of Indigenous Peoples and facilitates access to learning for school-aged children. Many households actually benefited, including a health service center in Assoumindélé, a school, and an orphanage (Foyer de Notre Dame de la Foret) at Bipindi under the Ocean division (elaborated in the specific community profile below). Note that this is the first time these communities have access to energy, and it has gone a long way in improving their standard of living and has triggered a positive relationship with neighboring communities.

In addition to installing and providing lighting for the beneficiary communities, some IP youths in the different localities were trained in basic maintenance tasks, such as changing bulbs, monitoring energy consumption, and addressing minor technical problems. For example, in Bipindi, under the project implemented by ADEPA, radio kits were distributed to community members to enable

Mobe community members after a focus group discussion

them to follow radio programs broadcast in the Bakola/Bagyeli languages. Energy management committees were set up at the community level to ensure the proper functioning and sustainability of the energy project and facilitate an easy transition to community management. These committees, selected by the community members, were trained by implementing organizations to manage solar panel systems and promote the rational use of energy. The solar energy project includes many Bakola/Bagyeli villages in the southern region. However, due to the inaccessibility of some areas, I was only able to visit Kouambo and FONDAF. Six Baka communities in the Messok subdivision also benefited from the project; however, my visit was directed to Djangue village, which has all the characteristics of the project. The selection criteria for visiting such areas were developed in collaboration with the implementing organizations.

1.3. Other Collateral Training Besides the Energy Project

This project focused on extensive awareness-raising about climate change and its impacts and equipped Indigenous Peoples with essential skills for income-generating activities. For instance, the Bakola/Bagyeli communities of Bipindi received training in radio broadcasting programs using indigenous languages, with some members being recruited as broadcasters and guards. Some communities, such as the Baka of Djangue village in Messok, were trained in income-generating activities such as gathering and preserving fruits, and the Mbororo women of Yolo were trained in milk preservation. The training initiatives were undertaken by their implementing organizations are elaborated in greater detail in Table 1.

1.4. Beneficiary Indigenous Communities with Access to Solar Energy

Cameroon has two groups of Indigenous Peoples who have benefited from the solar energy project: the forest-dwelling Pygmies (Baka and Bakola/Bagyeli) and the Mbororo people in the savanna and Sahel regions. The project was implemented by the civil society organizations of the Indigenous Peoples concerned. In all, five Indigenous communities across three regions—East, South, and West—benefited from the project. These regions are the most populated in terms of Indigenous Peoples in Cameroon.

Table 1: Overview of solar panel projects for the 5 benificiary Indigenous Communities

No.	Project Title	Beneficiary IP Community	Location	No. of Solar Panel (SP) and Household (H)	Focal organization
1	***Introducing Renewable Energy to Pastoralist Mbororo Indigenous Peoples***	Mbororo Pastoralist Community	Mobe in Batouri subdivision in Kadey division in the East region	5 SP for 5 H	MBOSCUDA
2	***Solar Energy and Capacity Building Project***	Mbororo Pastoralist Community	Yolo is divided into Kouncharp and Koundoum, which are located in the Koutaba and Foumban subdivisions. Both subdivisions fall under the noun division of the western region	Koichamcap: 4 SP for 4 H Nkoundoum: 5SP for 5H with 3 TVs (TVs bought by community members)	MADAKSON
3	***Module and production of solar kit: A sustainable solution for the electrification of the areas of the Baka Indigenous Peoples (IPs) in Messok council in the East region of Cameroon***	Baka: hunter-gatherer community	Village Djangue in the Messok subdivision, Haut Nyong division in the East Region	6 SP for 60 H with 6 TVs (TVs provided by the project)	ASSID
4	***Project to Combat Climate Change Through Sensitization of the Bakola/Bagyeli to the Adoption of Renewable Energy***	Bagyeli: hunter-gatherer community	Kouambo, FONDAF, and Deux Ponts in the Bipindi subdivision; Ngoyang and Lolodorf Centre in the Lolodorf subdivision in the South Region	Kribi 1, Kribi 2, and Lokoundje: radio kits Bipindi: 3 SP for 3 H Lolodorf: 2 SP for 2H	ADEPA
5	***Clean Energy in the Heart of the Forest***	Baka: hunter-gatherer community	Assoumindélé Ngoila subdivision, Haut Nyong division in the East Region	2SP for 20 H, 1 school, and 1 health service center (1 TV set in the community provided by the project)	OKANI

1.4.1. MBOSCUDA

The Mbororo Social and Cultural Development Association (MBOSCUDA) implemented a solar energy project in the Mobe Mbororo community located in the Batouri subdivision of the Kadey division. Mobe village is situated approximately 80 kilometers (km) from Batouri, the sub-divisional headquarters, and 70 km from Bertoua, the regional headquarters of the East region of Cameroon. The village lies 27 km from the main road (though unpaved) connecting the two cities. It is a typical Mbororo settlement mixed with few members of the local population and has over 5000 inhabitants. In Mobe, four solar panels are installed that serve eight households, including a mosque. A solar panel was installed in the home of the leader of the local population. This has triggered and strengthened a positive relationship between the two communities. The activities carried out here were sensitizing and training some youths on basic knowledge of solar energy installation usage, functioning, and management. There is no television set in this community, and the energy installation has not been used to the maximum.

1.4.1.1. Project Management

The Mobe Mbororo community, unlike others, did not receive training on the management committee for the proper functioning of the project activities. However, two young men, Bouba Zubayrou and Dawda Adamou, were trained in basic skills for managing minor issues like replacing batteries, changing bulbs and cables, and others addressing minor issues. Serious technical issues were referred to competent technicians based in Bertoua. Meanwhile, individual households managed their solar systems independently.

Mobe is located in the Batouri subdivision in Kadey division of East Region

A participatory process. Mobe community members, including women and children join the focus group discussion.

1.4.1.2. Impact of the Project on the Mbororo Community

a. Women in this community testify that they no longer use bush lamps that emit gasses into the atmosphere. The money used to buy kerosene is saved for different purposes. Before the arrival of light, households without money to buy kerosene would spend the evening in darkness.
b. Solar panels installed in the home of a traditional leader of a neighboring village of Kaka) fortified the relationship between the two communities.
c. Community members no longer travel to city centers to charge their phones (which cost 200 Central African Francs CFA francs (FCFA) or US$0.32 per phone) and other electronic devices.
d. Some youths in the community were trained on minor technical issues that could generate income.
e. Before the arrival of light into the community, there were armed robberies in the dark. Installing solar bulbs helped bring peace to the community.
f. Store owners can sell late into the night because there is light. But before the light came, they had to close at dusk because customers do not come out late in the dark.
g. Mbororo has one of the highest student populations among the communities visited. They can now use the light in the evening to study, improving their performance in school.

1.4.1.3. Challenges Faced by the Mbororo Community

a. The community is not well organized, as no management committee oversees the daily operations of the project.
b. The five solar energy panels are insufficient for the village's 5,000 inhabitants, leaving many people without access. Moreover, the solar panel at the mosque is underutilized due to a lack of technical knowledge among community members. The solar panel, which powers three batteries, is used for sound and lighting during the five daily prayer sessions, each lasting 20 minutes. With proper management, this setup could have also served nearby neighbors.

Photovoltaic system components at a mosque in Mobe

1.4.2. MADAKSON

The Madakson Cattle Breeders' Group (MADAKSON) renewable energy project in the West Region was implemented in an isolated pastoralist Mbororo community. The community is located 7 km along the boundary between two subdivisions within the Noun division. The Yolo community is divided into two sections: Yolo Koichamcap, led by Ardo Yaya in the Koutaba subdivision, and Yolo-Nkoundoum, led by Ardo Mamoudou in the Foumban subdivision. Since 2009, electricity cables have run through Yolo Koichamcap, powering neighboring villages. Despite this, the residents have never had access to electricity and remain under unfruitful promises by politicians.

"Before the arrival of the light, we had been using local lamps that were fueled with kerosene. Today, we do not spend money again to buy kerosene."

During the 2019 municipal and legislative elections in Cameroon, the politicians promised to facilitate electrification in the community. Electric poles were brought; however, after two years, these poles remained unused and were subsequently removed without the community members being informed. Currently, both communities prefer solar energy, which is permanent, regular, and cost-effective.

Adama Yaya, a woman from Yolo Nkounduom, testifies, "Before the arrival of the light, we had been using local lamps that were fueled with kerosene. Today, we do not spend money again to buy kerosene. We watched both the African Nations Cup and the World Cup at home. Because electricity is unstable, some villagers filled our homes to watch soccer matches during the Nations Cup and World Cup." This has generated mutual respect between the Mbororo people and neighboring villagers.

The Mbororo women of Nkoundoum were trained by MADAKSON inn dairy product preservation and were provided with two refrigerators for this purpose. Unfortunately, the low voltage cannot sustain the refrigerators. They were forced to abandon the business. Although they reported the issue to MADAKSON, they are still awaiting a response. In addition, MADAKSON extended dairy product preservation training to the neighboring Mbororo community of Didango. However, the Mbororo women of Didango did not utilize solar energy installation as electricity already existed. Energy projects were not considered a priority.

The map above shows the project implementation areas. Bafia in Central Region and Didango and Yolo in West Region were identified during the consultation phase. However, in the implementation phase, only Yolo benefited from the solar energy installation, despite the Mbororo women of Didango being trained in dairy product preservation.

A group of men from the Mbororo Community

Women and children of Mbororo

A family watching a solar-powered television

Mbororo women were trained in dairy product preservation. However, the photovoltaic systems cannot sustain refrigerators.

Yolo Koichamcap received four solar energy panels and several smaller panels, equipping four households with renewable solar energy lights. In Yolo Nkoudoum, five households each received one solar panel. Additionally, Yolo Nkoundoum has three TV sets serving the entire community, while Yolo Koichamcap has none.

Ibrahim, an elder in the Nkoudoum community, stated, “Community members are free from paying exorbitant electricity bills at month end unlike what is obtained in neighboring villages where there is electricity.” He further reiterates that “our neighbors are crying that they are paying very high electricity bills, whereas the light is very unstable and irregular all the time.”

1.4.2.1. Community Project Management

The most impressive aspect in both communities is the community ownership of the project. Here, management committees give each household the mandate to cater for their solar panels, perform repair work, and replace batteries without referring back to MADAKSON. As a result, the Nkoundoum bought their television sets for the children to use. Major technical issues are referred to the management committees for solutions, and if it is above their competence, they will contact MADAKSON for intervention.

1.4.2.2. Impact of the project on the Mbororo community

a. Before the arrival of solar light, women practicing tailoring did not work at night, but today, they can work late into the night, especially during festive periods. Community members testified that they no longer use bush lamps that emit gasses into the atmosphere. The money used to buy kerosene is saved for different purposes.

b. Community members can now watch the news and follow current events at home.

c. Community members no longer travel to city centers to charge their phones and other electronic devices.

d. The community is well organized, with defined responsibility and ownership of the project, and each household manages its lighting problems. MADAKSON trained some community members on troubleshooting minor technical issues like battery replacement, bulb changes, and basic repairs, facilitating knowledge transfer.

e. It has improved the education of their children with better performance. Children can read and attend repetition classes at home at night.

f. Persons with disabilities, like Mr. Abdoulkarimou Bello, benefited from the light installation in his room.

1.4.2.3. Challenges Faced by the Mbororo Community

a. The solar panels are limited and do not cover the entire community. In addition, community members lack the technical know-how to determine the carrying capacity of solar panels.

b. Some women stated they could not use their sewing machines at night because they did not have light in their homes. In addition, the solar panels cannot sustain light for extended periods, leading to power outages late at night. Note that the solar panels come with batteries, and the community replaces them when old or damaged. Even though they look physically good, the batteries weaken with time and cannot sustain energy late at night.

ASSID and OKANI implemented solar energy projects were in Messok and Ngoila subdivisions of the Haut Nyong Division in East Cameroon.

1.4.3. ASSID

The Association Santé et Innovations pour le Développement Durable (ASSID) implemented a solar energy project in the village of Baka Djangue, located in the Messok subdivision in the Haut Nyong division of East Cameroon. The beneficiary community is the Baka Pygmy community.

The Haut Nyong Division was created in 1920 with its headquarters in Abong Mbang. It has 14 subdivisions, among which are the Messok and Ngoila subdivisions, which host a large population of the Baka community in Cameroon. The map in the previous page shows the two subdivisions where ASSID and OKANI (*see profile on p.30*) implemented the solar energy project—Messok and Ngoila subdivisions.

This community is located over 330 km from Bertoua, the capital of the East Region. The implementing organization selected six villages, each of which will receive a television and a solar panel capable of powering ten households. The villages included Djangue, Bossenga, Djontal, Ditsiep, Lembe-Wudo, and Koungou. Due to road challenges, I only visited Djangue and used it as a representative sample of the other areas.

Solar lights are used instead of firewood to light up areas for days during death celebrations or festivals. This positively impacts the environment because solar light does not Produce or emit gas into the atmosphere. Apart from sensitization on the effects of climate change and solar energy usage, community members were trained to manage some minor technical issues related to solar lighting. In addition, ASSID trained the women in the community on other income-generating activities, such as preserving non-timber forest products, gathering and preserving fruits from the forest, and preventive measures against COVID-19.

During a focus group discussion, the community's traditional leader, Nkopani Iveric, stated, "We used to have at least one rape case every week perpetrated by boys from our neighboring community when our young girls return late at night from city centers. Today, all these are history". Therefore, with the advent of light in the community, it has become history because youth remain at home and watch television programs, play music, and dance in the evening. They do not go to the city centers and return late at night.

This community is a good example of children going to school to learn foreign languages and then coming back home to watch television programs so that they can participate in debates with their friends. Those children who neglect to go to school are prevented from watching television programs by the community leader, and as a result, they are obliged to go to school to participate in watching television programs in the evening. ASSID partners with a private enterprise that supplies energy lamps and tools to the beneficiary communities within the project zone. In the case of any damage to the batter or any other equipment, the partner will supply the replacements upon request.

Project banner in Baka Djangue


Solar panels installed on the roof of a home


Children enjoying television, which has motivated them to learn and understand the content better.


The solar energy systems facilitated increased social interaction within the community.

1.4.3.1. Community Project Management Structure

Haut Nyong has an excellent management committee that charges Baka and Bantu phone owners a fee of 200 FCFA ($0.32) to charge their phones. This money funds the monthly subscription to the television company Canal+. At the start, the community was paying 5.000 FCFA ($0.80) per month with a limited number of television channels, but now, they have increased the number of channels, which automatically augmented the fee to 10,000 FCFA ($15.99) per month. Viewing times have been programmed so that there is a period when adults can watch their news on the television, and children have their own period in the evening to follow up on educational programs. Children are provided with small wooden chairs acquired for that purpose, and adults have larger rubber chairs. The community can access channels Nathan+ at Canal+ 80 , which offer educational content. The television set was installed in the house of Nkopani Iveric, who is also the leader of the management committee.

Left to right: Leopol Sedar of ASSID, Chafah Isufah, the sub-divisional Officer of Messok, and author Dr. Adamu Yusufa, 10/03/2023.

1.4.3.2. Impacts of the Project on the Baka Community

a. Cultures of other Indigenous Peoples around the world are viewed and followed up through television channels, especially during the celebration of the International Day of the Indigenous Peoples, hence boosting the safeguarding of IP cultures in Cameroon.

c. Children keen on watching television programs became more motivated to attend school to learn new languages to follow and understand the TV content. This increased their academic performance and reduced school dropout rates.

d. Community members no longer travel to village/city centers for entertainment at night, improving their safety. This has reduced the number of rape cases perpetrated against young girls who returned late at night. They also save money as charging phones and other electronic gadgets is cheaper within the community than in city centers.

e. There is increased social interaction because most community members gather together and spend more time outside in the evening, engaging in activities like learning, discussing, or doing petit trading. At times, they are joined by members of the neighboring Bantu community.

f. Using bush lamps has drastically dropped, and people no longer spend money on kerosene.

g. Women can sell in the evening using light.

h. Community support and generosity grew as members contributed money to subscribe to more television channels after recognizing its impact on the community.

i. Unlike neighboring villages with hydroelectric power, community members avoid high electricity costs.

j. There is a strong management committee to cater to solar kits in the community.

1.4.3.3. Challenges Faced by the Baka Community

a. Light installation coverage is limited to very few households, such as those of traditional and other community leaders. Other community members are pleading for broader coverage to benefit everyone from the project, as it did not cover the entire community. Some community members feel excluded because there is no light in their homes, and they can only go to neighbors to charge their phones and watch television programs.

b. Due to the lack of solar installation in other households, the community leader's house is often very congested in the evening by children who come to watch educational programs on TV.

c. They lack the technical capacity to determine the carrying capacity of a solar panel or battery, which is a pressing issue.

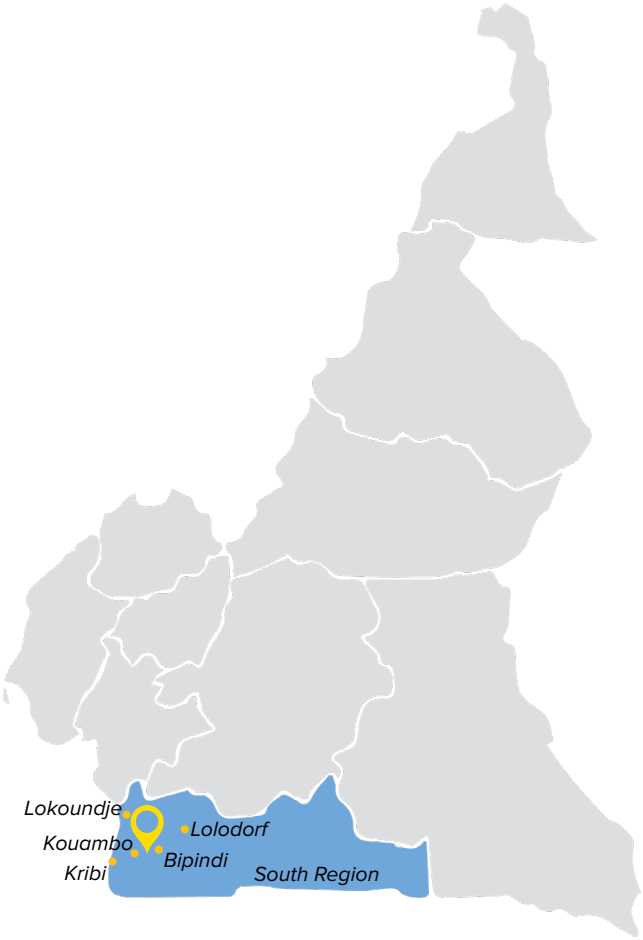
The author with the Kuoambo community members.

1.4.4. ADEPA

L'Association pour la Défense et la Promotion des Droits des Peuples Autochtones (ADEPA) implemented a project for the Bakola/Bagyeli community in Kribi 1, Kribi 2, Bipindi, Lolodorf, and Lokoundje subdivisions in the Ocean division of the South Region. Kribi 1, Kribi 2, and Lokoundje were provided only radio kits, not solar panels. Lolodorf has two installation centers, Ngoyang and Lolodorf, each with a solar panel for a household. Bipindi has three installation centers, including 2 Ponts, Kuoambo, and Foyer de Notre Dame de la Foret (FONDAF). Each is equipped with a solar panel that can only power one household. These centers are 60 km from Kribi, the divisional headquarters of the Ocean division. Kuoambo is a typical Bagyeli community that received a solar panel installation but no television set. They also received radio kits, allowing community members to listen to broadcasts in their Indigenous language from Radio Nkuli Makeli, which means '*the drum that carries the voice*' in Bagyeli.

When I visited this community on 11 March 2023, the solar panels had a technical fault, and the community was in darkness. A technician sent by ADEPA inspected the system on 27 February, two weeks before my arrival. However, subsequent repair has yet to be done.

ADEPA initiated feasibility studies, climate change awareness seminars, technical training on solar energy management (excluding Kouambo), basic radio broadcasting training in the Bakola/Bagyeli language, and COVID-19 awareness campaigns. Three trainees were recruited at Nkuli Makeli Radio in Kribi. Jeanot Mbille, Kouambo's community leader, and Valerie Samba were hired as broadcasters in Bagyeli and Bakola languages, respectively. On the other hand, Mandembo was employed as a security guard. Stakeholders like the divisional delegations of forestry, environment, and health were mobilized and involved in the project activities.



Project sites of ADEPA in South Cameroon. Kouambo is located very close to Bipindi and Kribi.

FONDAF is an orphanage in Bipindi founded in 1975. Presently, it houses 91 Bakola/Bagyeli children (35 girls and 56 boys) aged 6 to 19. The majority of them are in primary school, and only 13 are in secondary school. A solar panel and two television sets have been installed in the orphanage. One TV is for adults and the other for children. Both are kept in the discipline master's room. Due to limited space, the children's TV is often taken outside and set up in the open air, as the room cannot accommodate all 91 children. On sunny Fridays, the TV is moved outside to entertain children and keep them from visiting the city centers. Lights were also set up in two of their classrooms to facilitate evening reading sessions. Solar energy is used to charge phones and laptops so children and teachers can read, watch television programs, and enjoy sporting events.

1.4.4.1. Community Management Structure

The Kouambo community is not well organized and has no management committee that manages the solar energy project within the area, as the ADEPA manages everything. ADEPA and Radio Nkuli Makeli purchase batteries, cables, bulbs, and other materials needed for repairs or replacements. Unlike in other project areas, youths in the community were not trained to handle minor technical issues. The neighboring Bantu community members frequently visit to charge their phones and other devices, which has led to congestion and subsequent destruction of the charging system

The discipline master of FONDAF was trained to operate solar energy kits and perform minor repairs. Radio Nkuli Makeli established a WhatsApp group involving lead persons in the project areas and technicians. In case of any technical fault, technicians within the WhatsApp chat group will respond promptly and can proceed to the field to perform necessary repairs."

FONDAF is an orphanage in Bipindi founded in 1975. Presently, it houses 91 Bakola/Bagyeli children (35 girls and 56 boys) aged 6 to 19.

Children at FONDAF struggling to watch a Champion Leagues match through the window.

1.4.4.2. Impacts on the Bakola/Bagyeli Community

a. Community members use radio kits to stay informed about climate change and its impacts, health education, project activities, and other current events broadcast in Bakola/Bagyeli languages from Radio Nkuli Makeli.

b. Radio Nkuli Makeli generates income to support beneficiary communities by purchasing equipment and paying for repairs. In addition, some community members were trained in basic radio broadcasting and recruited to work at the radio station.

c. Children at FONDAF enjoy watching sports and current events on television. This has positively distracted them from roaming around city centers in the evening.

d. Solar lights were installed in two classrooms, providing children with a place to read, which has significantly improved their school performance

e. Community members do not go to village centers for entertainment and return late at night, improving their safety. The number of rape cases in young girls was reduced.

f. There was an increase in social interaction because most community members regrouped together and spent more time outside in the evening to do activities like learning, discussing, and petit trading.

g. Because of the alternative use of solar light, community members testified that they no longer use bush lamps or fell huge trees to set up fires during death celebrations.

h. No expenditure is incurred to travel to larger villages or city centers to charge phones and other electronic gadgets.

i. At FONDAF, a WhatsApp group was created to address technical issues at the community level. For instance, technicians can be contacted through this medium to advise on any technical fault.

j. Women can sell products at the village level in the evening using light.

1.4.4.3. Challenges Faced by the Bakola/Bagyeli Community

a. In some project areas like Kouambo, there was inadequate knowledge transfer to the communities, including a lack of training for youths on solar kit maintenance and management

b. There is no management committee in Kouambo to manage the light system. There was a disagreement at the time we visited the community, and the village was in darkness for about two weeks. They are unable to take full ownership of the project and manage it independently. All components, such as bulbs and cables, is purchased from ADEPA or Radio Nkuli Makeli.

c. Related to the previous point, there are no proper laid-down measures for a quick community takeover of the project. The community relies 100% on ADEPA or Radio Nkuli Makeli for any technical fault or repair work, such as buying batteries, bulbs, and cables.

d. Light installation coverage is limited to very few households, such as those of traditional and other community leaders. Some community members feel excluded because there is no light in their homes, and they can only go to neighbors to charge their phones and watch television programs.

1.4.5. OKANI

Association OKANI implemented a solar energy project in the Baka community of Assoumindele, located in the Ngoila subdivision of Haut Nyong Division in the East Region. Approximately 20 households in this community benefited from the installation of two solar panels, a television set, and solar lights for three classrooms in a primary school and a health service center sponsored by the World Bank. The health service center is a temporary place where nurses work during vaccination. It is not a permanent health service center for the consultation and treatment of patients. The health center was set up in one of the houses constructed by the World Bank Project to rehabilitate persons displaced by timber exploitation in the Ngoila Mintom forest project. Installing solar kits brought the community joy, allowing people to charge their phones using solar energy instead of bush lamps. They can also enjoy watching TV programs at home. However, community members subsequently neglected to take proper care of the children.

Solar-powered lamp in the Baka community

1.4.5.1. Community Management Structure

There is no strong management committee in Assoumindele, and during hunting seasons, community members move to the forests, abandoning their solar-powered houses for a small rent of 2,000–3,000 FCFA ($3.26-$4.88). Some owners return and discover that their solar kits are stolen or replaced with lower-quality kits. Some Baka community members connive with their neighbors to steal and sell the kits.

Another instance where poor management is evident is when some Baka individuals permitted truck drivers to charge their truck batteries using the solar-powered outlet, which poses a danger. This led to an explosion that destroyed the installation area. Although community members were trained to handle minor technical issues, they remained inactive. Likewise, the management committee did not function as intended.

1.4.5.2. Impacts of the project on the Baka community

a. Solar lights are used during festivals and other ceremonies. This replaces the traditional system of felling trees and burning wood for several days.

b. This replaces the formal system of felling trees and burning wood and bush lamps, minimizing gas emissions and protecting the forests.

c. Children keen on watching television programs became more motivated to attend school to learn new languages to follow and understand the TV content. This increased their academic performance and reduced school dropout rates.

d. Community members do not go to village centers for entertainment and return late at night, improving their safety. The number of rape cases in young girls was reduced. It appears the impacts are similar to those at the above sites.

e. Women can sell in the evening using light.

Technicians installing solar panels

1.4.5.3. Challenges Faced by the Baka Community

a. Some truck drivers were allowed to charge high-voltage batteries, which exploded and caused destruction in the installation area, which may affect the environment.

b. In Assoumindele, technicians are from cities 600 km away, making it very costly for the community and the implementing organization to bring them in for maintenance work.

c. Leadership management is very weak as they cannot claim total ownership of the project and manage it independently.

d. Light installation coverage is limited to very few households, such as those of traditional leaders, other community leaders, schools, and health service centers. Other community members are pleading for broader coverage to benefit everyone from the project. Some community members feel excluded because there is no lighting in their homes, and they can only go to neighbors to charge their phones and watch television programs.

e. There was no proper knowledge transfer to communities, such as training youth on maintaining and managing the project, hence the reliance to technicians from outside the community. This has led to the theft of energy kits by fake technicians who pretend to do maintenance work but end up replacing the original kits with lower-quality kits or deliberately eroding the kits.

2. Common Impacts Across Solar Energy Projects

No.	Factor	Impacts
1	Environmental	1. Solar lights are used during festivals and other ceremonies, replacing firewood and thereby reducing the need to fell trees. 2. Less use of bush lamps that emit gasses into the atmosphere.
2	Social	1. Access to solar energy increases mutual respect among the local population, including the neighboring communities. It has also raised the dignity and reputation of IPs. 2. Zeal to watch television programs encourages children to attend school and reduces dropout rates. It has also reduced school dropouts. 3. There is a reduction in social ills, such as rape cases, because young girls no longer frequent city centers at night, which has improved their safety. 4. Access to energy has increased access to information, which consequently raisesawareness of their rights and other opportunities.
3	Economic	1. Less money is spent on kerosene to fuel bush lamps and charging phones and other electronic gadgets in towns 2. Women operate small trading businesses at village centers in the evening. 3. There is knowledge transfer on managing solar kits 4. Unlike in other areas where hydroelectric power is available, community members are free from paying exorbitant electricity light bills at the end of the month 5. In some project areas, there is community ownership of the projects, either by management committees or individually. The community purchases and replaces batteries and other accessories.

3. Common Challenges

a. Limited coverage of energy to satisfy neighboring communities

b. Lack of technical know-how to determine each solar panel's carrying capacity is a pressing need in all project areas.

c. Solar panels are installed mostly at the homes of community leaders, mosques, and schools. The traditional power of chieftaincies is such that it is difficult for some members of the lower class of the communities to benefit freely from it. The underprivileged within communities are excluded.

d. The well-trained technicians are based in distant cities, making it expensive to bring them to the project areas. Consequently, the community experiences power outages that can last for days while waiting for their arrival.

e. Of the five beneficiary communities, four (Mobe, Kouambo, Yolo-Koichamcap, and Assoumindele) do not have functional management committees and knowledge transfer. Even though there is community ownership in Yolo Koichamcap, solar problems are handled by individual households.

4. Lessons Learned

a. Access to energy led to the initiation of capacity-building training that developed the skills of some community members to manage their solar energy systems. For instance, they can replace damaged cables and know the quality batteries they can buy from the market. This highlights a contrast among project site communities where training or implementation was insufficient."

b. Familiarity with solar energy over electricity due to its stability and affordability. Nearby communities that rely on hydroelectric power often experience power outages lasting weeks to months, and the monthly fees are exorbitant."

5. Recommendations

a. The initiative to create social enterprises such as petit trading, preservation, and selling of dairy product preservation and retailing of non-timber forest products, etc. in various communities should be encouraged. The income generated from the social enterprise will guarantee the sustainability of the solar energy project.

b. Proper feasibility studies, the use of free, prior, and informed consent (FPIC) from the community concerned with the project, and sensitization to the effect of climate change are fundamental for implementing projects of this caliber.

c. There is a need to build the capacity of the beneficiary communities to implement this type of project. This entails knowledge transfer to the community so that they can manage their project sustainably. Exchange visits and experience sharing could be conducted by implementing organizations and community members to observe good practices and scale them up to their areas. This can prepare them for effective takeover of project ownership at the end of the implementation phase.

d. Adopting communication means using small radio kids for sensitization and community education using IP languages such as those adopted by ADEPA should be scaled up to other communities. For the proper functioning and sustainability of the project, all beneficiary communities should create at least a strong management committee with focused objectives that oversee the day-to-day running of the project activities. In the end, it will not only ensure the transfer of project ownership but also the security of the solar energy kids and objects.

e. Right Energy Partnership with Indigenous Peoples, IP organizations, and partners need to mobilize more resources to not only scale up this magnificent solar energy project to cover other IP communities in more vulnerable situations but also to implement a high-voltage power transmission project that can better serve the needs of the beneficiary communities.

f. It is also recommended that REP partner up with the Barefoot College of India to train IP adults and women on solar energy techniques.

g. In the next phase of such a project, it is good to ensure that all five IP groups in Cameroon are involved—Baka, Bakola, Bagyéli, and Bedzang for the forest zone and Mbororos in the entire country.

h. Another recommendation for REP is to increase the funding budget to ensure that the maximum number of IP families can benefit from solar energy technologies, thereby enhancing overall efficiency.

6. Conclusion

The solar energy project that benefited the Indigenous Peoples of Cameroon is the first of its kind and has received much applause. All beneficiary communities have never had electricity in their areas and are experiencing this type of project for the first time. It has significantly improved not only the environment in which these communities dwell but also their social and economic well-being, which cannot be underestimated. In all the communities visited, the installations were limited to very few houses, and community members expressed the wish for wider coverage for the satisfaction of all.

Generally, the question of sustainability remains unanswered because, in most cases, community members are worried that they do not have the means to maintain the project after the implementation phase. Therefore, it is paramount to encourage the initiative of a social enterprise that can progressively generate income for the sustainability of the project ■

DEMOCRATIC REPUBLIC OF CONGO

Case study of Indigenous Peoples' access to renewable energy in the Democratic Republic of Congo

Author: Diel Mochire Mwenge

1. Introduction

In November 2019, the United Nations Development Program (UNDP), through the microfinance funds of the Global Environment Facility (GEF), launched as part of the OP6 Innovation Program: Access for Indigenous Peoples to Energy. This call for projects aims to reduce deforestation and protect forests and natural resources through the access of Indigenous Peoples to renewable energy.

Access to energy is a cause of deforestation and carbonization in the Democratic Republic of Congo (DRC). Declared a solution country to climate change, the country constitutes a biodiversity potential guarded by Indigenous Peoples and local communities. This program strengthens resilience mechanisms despite the challenges of deforestation following illegal logging.

Several organizations of Indigenous Peoples and those that support them applied by presenting several project proposals, seven (7) of which were selected in the provinces of Mai-Ndombe and Equateur.

The beneficiary organizations included the following:

1. Association des Femmes Pygmées Botshike (AFPB)
2. Association des Femes Bokatola (APPB)
3. CAMAID
4. Dignité Pygmée (DIPY)
5. Solidarité pour la promotion de la Femme Autochtone (SPFA)
6. Synergie des associations pygmées de Lokuku pour l'environnement
7. Association des paisans pygmées de Lokuku (APPL)

These organizations were selected at the end of the Steering Committee meeting to implement these projects in the provinces of Mai-Ndombe and Equateur:

No.	Project Number	Focal organization	Location	Domain (GEF)	Province
1	DRC/SGP/OP6/Y5/CORE/IPAE/2021/01	AFPB	Promotion of renewable energy for protecting biodiversity in Pygmy's environments IPs in Bokatola Londje	CC	Equateur
2	DRC/SGP/OP6/Y5/CORE/IPAE/2021/02	APPB	Contribution to the emergence of solar energy in the fight against climate change in village PA BOTSHIKE	CC	Equateur
3	DRC/SGP/OP6/Y5/CORE/IPAE/2021/03	CAMAID	Support for electrification and clean cooking in the PA Pygmies communities of Mai-Ndombe using solar equipment	CC	Mai-Ndombe
4	DRC/SGP/OP6/Y5/CORE/IPAE/2021/04	DIPY	Promotion of renewable energies as alternatives to the use of wood energy by the Pygmy PAs of Mai-Ndombe in the Inongo Territory	CC	Mai-Ndombe
5	DRC/SGP/OP6/Y5/CORE/IPAE/2021/06	SPFA	Promotion of renewable energies in Pygmy communities to fight climate change	CC	Equateur
6	DRC/SGP/OP6/Y5/CORE/IPAE/2021/07	CAMAID		CC	

Note that the program offers an innovative opportunity as a solution to the problem of access to renewable energy. The program focused on the following priorities:

- Projects aimed at empowering Indigenous Peoples to accelerate the progress in renewable energy;
- Projects with multiple co-benefits, including greater community cohesion, that contribute to at least two of the UN Sustainable Development Goals (SDGs);
- Projects that guarantee the participation of Indigenous women and young people and consider their needs and aspirations in accordance with their self-determined development;
- Projects that test appropriate renewable energy technologies on Indigenous Peoples' lands and territories (e.g., micro-hydro, solar, wind, biogas, etc.);
- Projects that establish economic incentives for Indigenous Peoples to join international efforts (i.e., bilateral donors, Green Climate Fund, etc.) to recognize the role of their lands and territories in mitigation and adaptation to climate change;
- Projects that form partnerships between Western scientific approaches (such as remote sensing and geospatial monitoring institutions) and traditional knowledge systems, indigenous cosmology, and worldviews;
- Projects that seek to meet recommendations arising from national action plans (i.e., UNFCCC NDCs, NAPAs, NAMAs), regional and/or sub-national energy strategies.

2. Methodological Approach

To achieve the reliable results described in this report, a combination of participatory approaches was used during the analysis. This combination followed two (2) stages, namely: i) the preparatory phase and ii) the data collection phase and the preparation of the report.

2.1. Preparatory Phase

a. Discussion and Harmonization of the terms of reference

After discussions on the terms of reference drawn up by the consultants, the terms of reference were approved by UNDP before launching the process, followed by the signing of the contract. A working session was organized in Douala with the Secretary General of the Network of Indigenous and Local Populations for the Sustainable Management of Forest Ecosystems in Central Africa (REPALEAC) to facilitate an understanding of the methodological approach to be followed in the field.

b. Understanding the UNDP

In this report, the term *UNDP* is understood as an international conservation organization headquartered in Switzerland. It has been established in several countries around the world where it supports states and governments in the process of conservation and sustainable management of natural resources.

c. Literature/documentary review

This step was primarily focused on collecting information through the documentation made available to us by UNDP and other stakeholders, as well as internet research results related to UNDP activities and the rights of communities in the conservation process.

d. Identification of stakeholders

A list of stakeholders to contact for interviews has been drawn up in accordance with the evaluation's terms of reference, which focuses on the analysis of the implementation of UNDP strategies and principles on the rights of Indigenous Peoples and conservation at the local and national levels. This work also consisted of identifying civil society organizations that have directly benefited from the UNDP- Small Grants Programme (SGP) project so far but could be involved in one way or another in the conservation and defense of the rights of local communities and/or the Baka people.

3. Brief History of the Indigenous Communities

Living off forests and biodiversity, the **Indigenous Pygmy peoples** benefiting from the project in the villages of **Luatekaka** and **Bolingo** in the province of **Ma-Ndombe** in the Democratic Republic of Congo expressed the need to light up their villages.

Despite this potential, only 7% of the Congolese population has access to lighting, including 0.1% of the Indigenous Pygmy peoples. Insufficient electricity is a driver of deforestation in the Democratic Republic of the Congo.

The communities of the two villages have lived for millennia in their forests, using the traditional method as a form of resilience in individual lighting in households. These communities were in a very particular situation insofar as public lighting did not exist, and whenever cases of illness arose during the night, serious problems were observed in reaching a nearby health facility. This was the basis of the high mortality rate.

"Only 7% of the Congolese population has access to lighting, including 0.1% of the Indigenous Pygymy peoples."

Luatekaka and Bolingo in the province of Mai-Ndombe were selected as the project sites.

4. Overview of the REP – UNDP SGP Project Implemented

Our case study targets the Democratic Republic of Congo project, particularly seven (7) projects funded under the call for projects related to renewable energies. These projects were an innovation in the fight against deforestation through the use of energy-efficient lighting in villages. The projects have contributed to improving the living conditions of Indigenous Pygmy peoples and to the conservation and protection of forests and natural resources. The projects are part of the mechanisms to fight against climate change and the conservation of biodiversity in the areas of implementation.

A grant from the SGP program, up to US$50,000, was used to purchase solar equipment. On the basis of the contract signed between DIPY and the program, the work plan and the disbursement were respected by the two (2) signatory parties through four (4) installments, each of which was carried out based on the presentation of the report and its validation by the program. The focal point of the program could provide support through the orientations to DIPY via the staff assigned to the project.

4.1 Brief description of the renewable/community energy project

The project promotes renewable energies as alternatives to wood energy used by the Indigenous Pygmy peoples of Mai-Ndombe in the Inongo Territory in two Indigenous Pygmy villages, Luatekaka and Bolingo. It aims to provide access to renewable energy in the fight against climate change in Inongo.

Solar panels bringing sustainable solutions to the Mai-Ndobe communities.

4.2 How is it managed?

The organization Dignité pygmée (DIPY) was in charge of the implementation and management of the project. However, a community committee has been established to monitor and take ownership of the project. This project is the result of a free, prior, and informed consultation process to identify priority and urgent needs. This motivated DIPY to support the communities in this project.

A monitoring mechanism for the sustainability of the project is put in place by the communities, and the members of the said communities have benefited from a series of trainings on maintenance and monitoring the performance of the project's achievements.

Solar-powered television provides information and entertainment to the community.

4.3 Project results : Project benefits to the community

The project was successful in the intervention area, which had no access to energy before the project. The project paved the way for new technology, such as television, which is something new in the area. Visual information, in addition to the radio to which fewer beneficiaries had access, is currently available in the villages. In addition, public lighting is available, which has an impact on security in the areas and has led to the reduction of thieves, bandits, rapists, etc.

The increased vibility at night deters potential crimes and enhance community safety.

4.4 Product End Use

The communities use these street lights in the villages. They also discovered tools and materials capable of meeting their needs in terms of lighting. Even traditional houses now have access to lighting, which is a positive effect of development. Each village has a flat-screen television and equipment for installing cinematographic units, electric cables, converters, and regulators.

5. Challenges, Lessons Learned, and Opportunities

1. Unavailability of materials, tools, and technicians in the locality.
2. The costs of purchasing and transporting materials, tools, and technicians from Kinshasa are incredibly high.
3. Given the number of villages with the same needs and conditions, the increased demand is a source of conflict between the communities of the beneficiary and non-beneficiary villages, as well as the non-beneficiary communities and the implementing organizations.
4. Limited financial means in view of the importance of the project.

6. Recommendations

1. Extend the project to other provinces such as North Kivu, South Kivu, and Tanganyika to contribute to the implementation of the law on Indigenous Pygmy peoples in the DRC .
2. Train technicians within the beneficiary communities to ensure the maintenance and sustainability of the project in the DRC and avoid importing technicians in the event of technical breakdowns.
3. Provide monitoring and capitalization support for visibility and documentation using REPALEAC
4. Involve the competent authorities in the implementation of the project as well as the local communities neighboring the project villages to reduce conflicts and promote social cohesion and peaceful co-existence for lasting peace.
5. Increase the amount of funding for consistent project indicators and results ■

EL SALVADOR

Access to Photovoltaic Energy for the Indigenous Peoples of El Salvador

Author: Dennis Mairena Arauz

1. Background

The project was implemented in the municipalities of **Cacaopera** and **Guatajiagua** in the hamlets of El Rodeo, La Estancia, Colón Canton, Aguas Blancas Canton, and the Acolgua Indigenous community, all of which are located in a geographical area known as the Central American Dry Corridor.

The Cacaopera Indigenous People, who are cross-border people located between Honduras and El Salvador, predominate in this area. Their eponymous language, Cacaopera, is part of the Ulúa linguistic family and translates to "cacao orchards."

Given the rough road conditions, access to these communities is done by a four-wheel drive vehicle. The hamlets are characterized by houses scattered over a very wide geographical area and separated from each other, with distances of more than 500 meters and distributed within the dry forest.

The coverage of the education and health systems in the area is low, and the distance and time to access these services are considerable. In relation to education, communities like La Presa do not have a school. In contrast, El Rodeo has a school that covers up to ninth grade, and Colón covers up to fifth grade[1].

The locality has a health unit, but it takes at least two hours to reach from the hamlets. The three towns receive their water supply from the Torolá River using a polypropylene duct system.

The geographic isolation and topography of the area hindered the population from having access to electricity before the project's implementation.

The municipalities of Cacaopera and Guatajiagua are in the Department of Morazán

1 Municipal Mayor of Cacaopera, Department of Morazán. 2017. Participatory Strategic Plan for Cacaopera's municipality 2018-2022. Cacaopera, December 2017.

82.7%

of Cacaopera population identifies as IP

98.6%

of Cacaopera IPs are Kakawira

44

legalized Community Development Associations

In the municipality of Cacaopera, 82.7 % of its inhabitants identify themselves as part of Indigenous People, with 98.6 % of them being Kakawira. Forty-four (44) community development associations within the Cacaopera Municipality have achieved their legal status granted by the municipality. Indigenous associations in the area vary in legal status: some do not have legal status, while some were formally recognized by the municipality or the Ministry of the Interior at the national level. Community Development Associations are constituted by inhabitants of communities in neighborhoods, cantons, and hamlets. They are organized to address issues of collective interest, be they social, economic, cultural, religious, civic, educational, or any other relevant aspects for the community. The minimum number of participants in an association is 25 people, which makes up the general assembly. Once constituted, they request their legal status from the corresponding municipality, and once approved, they are published in the Official Gazette.

On 12 June 2014, the Constitution of the Republic of El Salvador finally recognized the Indigenous Peoples of the country after decades of struggle. Article 63, second paragraph of the reformed constitution, states that “El Salvador recognizes the Indigenous Peoples and will adopt policies in order to maintain and develop its ethnic and cultural identity, worldview, values, and spirituality.”

This recognition led to progress in advancing the rights of Indigenous Peoples at the national level, culminating in the creation of El Salvador's National Action Plan for Indigenous Peoples (PLANPIES). This plan serves as a framework for implementing the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which was signed by the government of El Salvador in 2007. PLANPIES includes the National Health Policy for Indigenous Peoples in El Salvador, in which ancestral knowledge is recognized. Despite this, there is no recognition of the collective ownership of Indigenous lands and territories in the legal framework.

The means of life in these hamlets are limited by their location in the Central American Dry Corridor, where all economic activity is subsistence and oriented toward self-consumption. It is important to note that the Dry Corridor is a strip of territory that crosses Costa Rica, Nicaragua, Honduras, El Salvador, and Guatemala. More than 10 million people live there, many of whom are engaged in agricultural activities, especially the small production of basic grains. It is an area highly vulnerable to extreme climatic events, where long periods of drought are followed by heavy rains that strongly affect the livelihoods and food security of local populations. Eighty percent of small producers live in poverty, and many people are forced to migrate.

Starting in 1960, non-Indigenous families began a process of occupation of Indigenous lands, El Rodeo (central Caserío of the Cantón La Estancia). By 1970, many Indigenous people were salaried workers for Ladino landowners, working as waiters, and they turned more toward the work of rigging (henequen crafts), which was carried out by children and women.

CACAOPERA

61.6%
IPs employed

47%
IPs work as agricultural day laborers

25.5%
IPs engaged in substinence farming

38.4%
IPs involved in hammock weaving

63.2%
of IP women are hammock weavers

38.4%
IPs involved in hammock weaving

GUATAJIAGUA

13.8%
IP families receiving overseas remittances

100 % meeting participants in this study were women

Currently, for example, in Canton La Estancia, 65 % of the land is in the hands of 15 % of the population, registering properties of 30, 50, and up to 70 hectares. Meanwhile, 85 % of the population owns 35 % of the land, with plots of a half to 2 hectares. Given that there was a process of buying and selling land to improve the situation of small farmers after the war, it can be assumed that the process of land grabbing was even greater before the war than it is today.[2]

In the case of Guatajiagua, more than 100 women work with black clay to make utilitarian crafts. They do not know about the possibilities of using electric kilns or drying their ceramics; they do not see that possibility yet, but that means the depredation of the forest.

There are no surpluses for the market in the project area. The soils are of forest vocation (dry forest). Land titling is individual. The agricultural production plots are characterized by areas of less than one hectare, which contain basic grains (maize and beans). In the municipality of Cacaopera, 61.6 % of the Indigenous occupational force is employed, with 47 % working as agricultural day laborers, 25.5 % engaged in subsistence farming, and 38.4 % involved in hammock weaving. A significant portion (63.2 %) of Indigenous women are hammock weavers. In the case of the Acolgua Indigenous Community in Guatajiagua, Indigenous women have organized themselves into an association of manufacturers of utilitarian black clay vessels. Among Indigenous families, 13.8 % receive money remittances from abroad[3].

It should also be noted that in the meetings held during this case study, 100 % of the participants were women. It was not possible to obtain a clear answer to the question about the absence of men; however, knowing the social dynamics of Central America, we can assume that most of the men from these communities have migrated to the USA or are in prisons because of the current government's public security policy and its fight against gangs and their networks.

2 Lara M. Carlos B. Indigenous identity and social conflict in Cacaopera. Lecture presented at the First International Colloquium on Literature and Testimony in Central America, held at the University of El Salvador in March 2001.

3 Final Report, Cacaopera Pilot Census, Department of Morazán. (2018). El Salvador: May-September.

2. Overview of the Implemented REP-UNDP SGP Project

The OP6 Innovation Program (SGP GEF Global Environment Facility Small Grants Program[4] El Salvador), in cooperation with the Indigenous Peoples Major Group on Sustainable Development (IPMG)[5], signed an agreement for the global support of small renewable energy projects for Indigenous Peoples. This initiative is aligned with Sustainable Development Goal (SDG) 7— ensuring access to clean energy for everyone — and is supported by the Right Energy Partnership with Indigenous Peoples (REP).

In the case of El Salvador, the IPMG coordinated with the Central American Indigenous Council (CICA) and, in turn, with the National Indigenous Board, led by the Salvadoran National Indigenous Coordinating Council (CCNIS)[6]. Together, they supported and joined REP in the country; thus, the initiative "***Photovoltaic Energy Access to Indigenous Peoples of El Salvador***" was born.

Before identifying investment opportunities in solar energy and learning about the IPMG-REP initiative, CCNIS had already conducted community diagnostics. During these assessments, a series of investment priorities were identified for the communities, one of which was the critical need for access to electricity. Therefore, when IPMG-REP opens the call, CCNIS participates and wins the opportunity to become involved in the solar panel project.

Because the CCNIS does not have legal status (*see endnote*), it is not capable of being a recipient of funds. Faced with this situation, the CCNIS established administrative arrangements with the Cultural Association for the Performing Arts (ESCENICA) to play the role of fiscal sponsor, organizer, and executor of the project. Jointly, CCNIS, ESCENICA, and UNDP considered that ESCENICA should have specialized technical support on the subject of the project. Thus, the company AES El Salvador was identified and hired as a specialized technical service provider[7].

Before starting the negotiation process with AES, CCNIS, and ESCENICA, accompanied by UNDP, the consultation process was carried out to obtain the prior, free, and informed consent of the communities. As expected, given the isolation of the communities, they willingly accept the idea of accessing electricity.

The administrative process of the project involved making quotes, preparing the Terms of Reference, and signing contracts with the company AES El Salvador in order to guarantee the efficient provision of the installation service of the photovoltaic (PV) energy system and conventional energy. The process continued with community assemblies and meetings with Indigenous leaders to go into detail about the operating specifications of the energy system that would be installed; thus, they assumed their role in the decision-making process.

The various actors appointed personnel who would facilitate the coordination and support in the various jobs to be performed. The activities started with visits to identify and georeference the beneficiary homes. Then, measurements were taken of the areas to be worked on. Later, the holes were drilled for the placement of poles, materials were transferred, cables were laid, solar panels were transported and installed in homes, and training on the proper use and handling of PV power systems was provided.

The community members were unable to participate in this specific phase of panel installation due to AES security protocols. The company only employs its own staff, equipped with all necessary tools, instruments, and accessories, to guarantee the proper functioning of the PV systems and occupational safety.

4 The Global Environment Facility is the world's largest funder of protecting biodiversity, restoring nature, reducing pollution, and responding to climate change in developing countries. Fund international environmental conventions and country-led initiatives that generate global benefits.

5 The Main Group of Indigenous Peoples for Sustainable Development (IPMG), established in 2017, is a World Coordinating Committee (CCM) made up of seven focal organizations based on the seven sociocultural regions of the world. The seven sociocultural regions are:Africa, Asia, Arctic, Latin America, North America, Pacific, and Russia. In addition, representatives of Indigenous women and youth were incorporated. This committee has two vice-chairs: the Tebtebba Foundation (International Center for Policy Research and Education of Indigenous Peoples) and the International Indian Treaty Council (IITC). Within this framework, the alternative energy program REP - Energy Rights (REP) was created.

6 CCNIS. Founded on November 15, 1992, it currently brings together forty Indigenous organizations at the national level (of the Lenca and Náhuat Indigenous Peoples).

7 ESCENICA used the direct contract modality with its subsidiary AES, an eastern electrical company. AES is a subsidiary of the U.S. electricity company AES. It operates the distributors Caess, Clesa, Deusem, and EEO, which together provide service to 77 % of the country's electricity market and have more than one million three hundred thousand customers globally. AES provides affordable and sustainable energy to 14 countries through a diverse portfolio of distribution businesses and thermal and renewable generation facilities.

NOTE:It should be noted that CCNIS has chosen not to legally register as an Indigenous, non-profit organizationto avoid commitments with the political parties of the governments in turn, which are the ones that grant the endorsement to achieve the status of legal status, sometimes under conditions.

2.1 Brief Description of the Community/ Renewable Energy Project

Funding recipient: Cultural Association for the Performing Arts (ESCENICA)
Country: El Salvador
Area of work: Solar panels – Climate Change Mitigation
Donation amount: US$ 150,000
Co-Financing in kind: US$8,000 (CCNIS and communities)
Project Number: ELS/SGP/OP6/Y6/CORE/CC/2021/002
Status: Successfully completed

Characteristics and Results of the Project

Focused on rural electrification, the project installed 24 solar panels (PV systems) in the communities of La Presa, El Rodeo, and the Colón.

Each system is made up of a 400-watt photovoltaic module that receives sunlight to convert it into energy through a microinverter for domestic use. The energy generated by PV systems is sufficient to light up to three 15-watt LED bulbs, use four electrical appliances, and charge two cell phones at the same time.

In addition to benefiting families in their homes, PV systems were installed in the following areas:

- The Multiplepurpose Community Center of the municipality of Guatajiagua, with the modality of changing from a conventional meter to a bidirectional meter system
- The Child Development Center of the Indigenous community of Acolgua in Guatajiagua

An additional benefit obtained in this project was the participation of the private company AES, which, on its own initiative—and surely for economic interest—decided to build a new conventional electrification project that included the installation of 63 poles for power lines, bidirectional meters, six transformers, and more than three thousand meters of cable network to benefit these communities[8]. AES also delivered wood-saving stoves to 21 families.

This extension provided the opportunity to have a bidirectional energy system, which means that the houses alternate their energy supply between the solar panel and the national network just by turning on a switch. The way these systems operate is that during the day, the solar panels provide energy to homes, and the surplus energy not used in homes is incorporated into the national energy system. At night, users use energy from the national grid, eliminating the need to purchase accumulators or batteries

In addition, this bidirectional system allows for relatively low billing for energy consumption from the national grid because the PV system supplies surplus energy back to the national grid.

To better understand the role of AES, it is necessary to know that it is in charge of providing the generation, distribution, and maintenance of a large part of the national energy system under contract with the official instance of the Honduran State.

8 Idem. AES installs solar energy and electricity grids in the rural communities of Morazán.2022

2.2 How is it being managed?

Because CCNIS does not have legal status, the administrative management fell to the NGO ESCENICA. ESCENICA received funds from UNDP and proceeded to make payments to the AES company based on the progress of the services provided. Payments were made once CCNIS, ESCENICA, and community members verified the contractual terms versus the physical progress achieved by AES. Representatives of each family received explanations about the components of the solar panel system, its functions, and its mode of operation. At the end of the project, each of the 24 families owns their photovoltaic system and is responsible for its operation and maintenance.

Selecting AES as a representative provided multiple benefits for the project and for the families since this company supports the national energy system in such a way that it has the trajectory, experience, means, and highly qualified human resources to run the project. The personnel of the AES company, duly equipped with helmets, vests, harnesses, boots, and tools, took charge of installing the solar panels for security and guarantee reasons. There was no opportunity for the community to participate in the labor activities.

As AES works closely on the national energy network, it took the initiative of bringing the high-voltage wiring of the national system to the communities and facilitated the delivery of 21 wood-saving stoves. According to an interview with the coordinator of the GEF-UNDP project, this company will attend to the long-term operation of solar energy systems.

2.3 Project Results: Benefits of the project for the community

The beneficiaries of the project are as follows:

CACAOPERA

LA PRESA
EL RODEO
THE COLÓN

200 women

150 men

GUATAJIAGUA

LENKA COMMUNITY DEVELOPMENT ASSOCIATION OF GUATAJIAGUA

300 boys and girls

650 TOTAL DIRECT BENEFICIARIES

3,200 TOTAL INDIRECT BENEFICIARIES

2.3.1 Economic benefits

a. A novel aspect of the project is that these PV energy systems are hybrid (bidirectional), i.e., they use solar energy during the day and at night from the national grid. Part of the novelty of this system is that the surplus energy that is not used during the day is supplied back to the national grid, which brings economic benefits by reducing the user's energy bill. Another benefit of this hybrid system is that installation costs are reduced because there is no need to invest in batteries or inverters.

b. It has contributed to improving the economy of the families because, according to what was expressed by the Indigenous women, with the energy service in their homes, they have the option of working additional hours to make woven handicrafts, such as hammocks and *matatas* (bags). While this situation is often questioned because of the increased workload for these Indigenous women in the communities, interviews with them revealed that they are happy to extend the working day.

c. Some families have started selling a wider variety of consumer food products to the public.

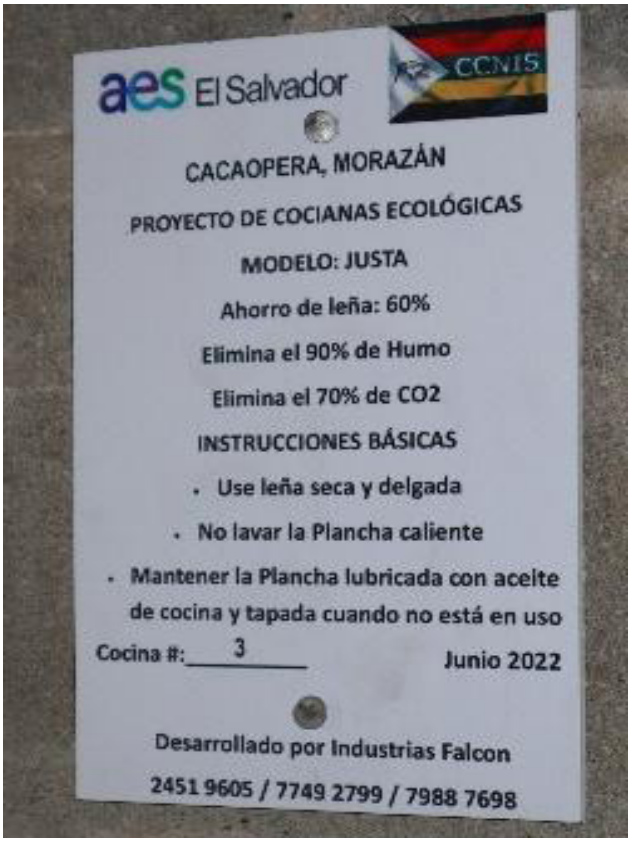
d. The relationship between economics and culture can be strengthened because by having more time to prepare food or crafts, there is greater cultural reproduction, and livelihoods are strengthened.

e. The fact of having electricity has made some families acquire some electrical appliances, improving their standard of living a little. In some cases, a small income has been generated from the sale of ice and soft drinks. They now have TV, radio, and cell phones, which allow them to establish a connection with the world.

2.3.2 Environmental benefits

a. As part of its corporate social responsibility, AES delivered 21 wood-saving stoves. This will probably help reduce respiratory diseases and environmental pollution in the future.

b. Before the implementation of the project, homes were lit with candles or kerosene lamps, which emitted gases and incurred economic costs, in addition to the fact that the lighting was insufficient. This situation has now changed.



c. The construction of ecological kitchens provides several collateral benefits, including reducing firewood consumption by up to 60 %, decreasing smoke by up to 90 %, and cutting CO_2 emissions by up to 70 %. These improvements enhance health levels, living conditions, and the economy. (*See photo of small poster above with information distributed to each user of the stoves*).

d. Families have the option of switching to a hybrid system, which implies the use of PV energy from the project and energy from the national electricity grid system. It must be considered that El Salvador has 90% of its electrical energy from clean energy sources. According to data from ECLAC, 95% of households in rural areas of El Salvador have electricity[9].

9 Statistics of the electricity subsector of the countries of the Central American Integration System (SICA), 2019 and progress to 2020 (cepal.org)

2.3.3 Social Benefits

a. This project strengthened the organizational fabric of the communities in the municipalities of Cacaopera and Guatajiagua because there was an increase in the level of participation of the community in activities related to information and decision-making on electrification.

b. Now, meetings of the communal groups can be held without affecting their working hours, thus allowing more time and a relaxed setting to discuss matters of collective interest, especially in the case of the communal house of Guatajiagua.

c. Young people who received training on minimal maintenance of PV systems developed skills that now allow them to have a new perception of new projects and initiatives.

d. The 24 beneficiary families enjoyed lighting in their homes for the first time and allowed them to expand their family, educational, entertainment, and work activities at home.

e. Throughout the implementation process, the expressions of enthusiasm and interest in renewable energy were strong. There is now a greater mental openness to accept new technologies.

f. The women participating in the meetings indicated that students now have improved conditions to engage in online searches, homework assignments, and nighttime study.

g. It can become a symbol of the community and a source of pride and identity[10].

2.3.4 Productive end use

a. The agroecological and productive conditions of the Central American Dry Corridor are quite limiting, which means that agricultural activities are limited to subsistence agriculture, only for self-consumption and forestry activity (dry forest), from which they extract wood for their stoves and wood for home repair. Therefore, up to now, the project has not demonstrated the relationship of energy with productive forestry or agricultural activities.

b. The electricity generation capacity of the solar panels is limited to having six LED bulbs per home, TV, radio, and cell phone chargers, and a little surplus energy that they deliver to the national energy network.

c. The lighting provided at night allows families - women specifically - more time availability and better conditions to work on weaving their hammocks, socialize with other weavers, and connect with the outside world through the web.

10 Various studies have produced statistics on the benefits for communities derived from the development of renewable energy in specific areas. Many of them focus on economic benefits and include projects of various sizes and ownership models. See: Terry Flowers and Marguerite Kelly, "Wind Energy for Rural Economic Development" (NREL: US Department of Energy). 2005, and "Community Benefits from Wind Power". 2005.

3. Challenges, Lessons Learned, and Opportunities

Challenges

a. The agroecological characteristic of the area (Dry Corridor) is highly limiting to expand agricultural activities and for the development of other ways of life, or to transform products of agricultural or forestry origin with the help of electricity. Therefore, the challenge consists of rethinking and defining new ways of organizing production and identifying responses to social and environmental problems where electric power is a driving element.

b. These hamlets have a majority of the female population or workforce since the men have migrated to the United States or are in jail. This means that 75% of the income comes from remittances. This can limit the necessary transformations in livelihoods through electricity since it is easier and more numbing to depend on money remittances.

c. One of the great challenges that was overcome from the beginning of the project was the assurance of sustainability through the contracting of AES since its high involvement in the official instances of the energy sector allows them to ensure that these communities are fully incorporated into the national system or national energy network.

Lessons learned

a. The formation of a solid coalition and alliance among CICA, CCNIS, ESCENICA, Communities, AES, UNDP, and GEF allowed the development of a PV energy project in a fluid and effective manner.

b. The success and achievements achieved in the short term in these communities foster motivation and interest in other communities to replicate the project.

c. It is important to highlight that having a contractor with skills and experience, such as AES El Salvador, in the assembly of equipment and an interested counterpart capable of following up and providing all the technical support to solve investment problems facilitates the success of the project.

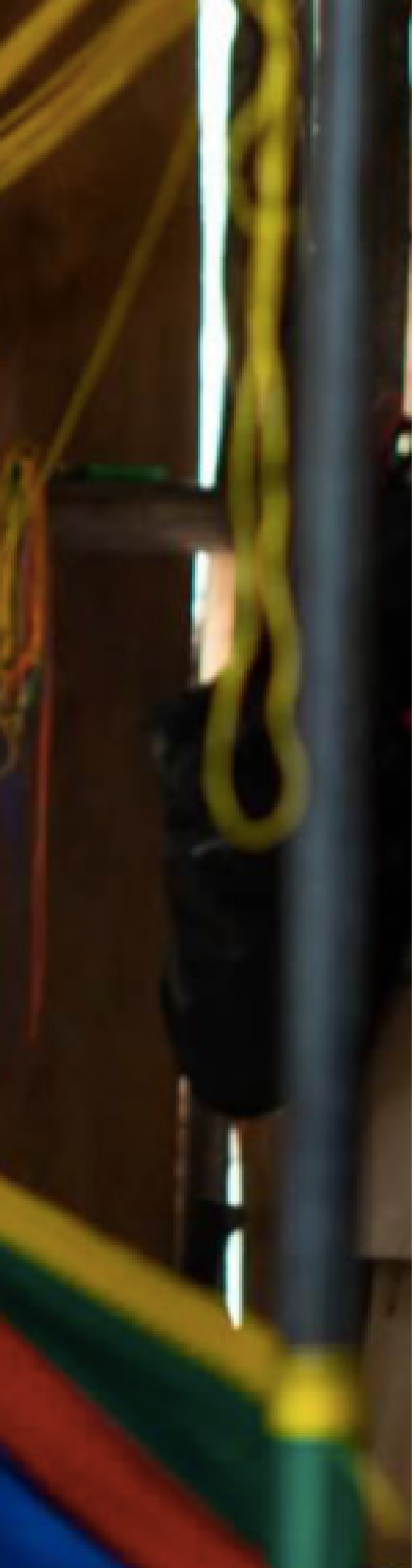
d. The project contributes to complying with the lines, objectives, and strategic actions identified in the National Action Plan for Indigenous Peoples, known as “PLANPIES,” and contributes to actions to meet objectives 7, 10, and 11 of the SDGs.

e. The transition to this new technology can provide important economic opportunities; however, it is necessary to define policies and strategic lines that ensure the full and effective participation of Indigenous Peoples, a reduction in costs, and a fair and equitable distribution of benefits among communities.

f. Participatory diagnoses that have been conducted in the past have focused on the development of livelihoods based on the resources offered by the environment, without considering the megaprojects that indicate or will affect these areas of poverty

"Before, we battled with darkness. We worked the hammocks at the end of the afternoon or night because it was cooler. With electricity, we can now charge lamps or turn on a spotlight at night and weave more comfortably."

- Virginia Ortiz, an artisan benefiting from the electrification project



Opportunities

a. The wealth that these communities possess is represented by solar energy. Solar energy is a viable alternative for the transformation of livelihoods and the development and prosperity of Indigenous communities, especially those that are isolated and that have no possibility of being connected to the national energy network in the short or medium term.

b. Despite the strong isolation, the communities generate electricity to sell to the national grid, supplementing their income and reducing their economic dependence on unproductive agriculture.

c. The participation of AES presents a good opportunity for future collaborations on new solar energy initiatives, not only in El Salvador but also in Guatemala and Honduras.

d. The surplus energy generated in this photovoltaic system allows the national grid to feed the electricity system, reducing energy use costs at home.

e. Families now have access to lighting and save money by avoiding the purchase of firewood and kerosene and increasing their potential for economic ventures, such as honey production.

4. Recommendations

a. It is recommended that the communities establish an agreement directly with AES El Salvador so that the operation of the photovoltaic system is monitored periodically in terms of preventive maintenance that can be carried out by the community.

b. Given that international banks (CABEI, IDB, WB, KfW, and others) are investing in renewable energy for small- and medium-sized rural and housing companies in rural and urban communities, REP can leverage its past experiences to engage with them and expand programs across the Central American region.

c. A maintenance plan must be drawn up for each of the teams, and work instructions must be issued to the community members or those in charge of maintenance.

d. Establishing exchanges between communities that have similar projects to strengthen knowledge and search for innovative alternatives

e. Conduct analysis to determine the opportunities for Indigenous organizations to create renewable energy companies to serve non-interconnected areas in the short and medium term.

f. Study the possibility of expanding the project with other components that support the economic and environmental sustainability of Indigenous families, such as honey bee production and watershed rescue, to allow them to establish fruit tree nurseries and timber trees for reforestation.

Annexes

Annex 1. Methodology

The methodology used to conduct this study was qualitative, descriptive, and intercultural. The report format used was provided by the REP office.

First, an information search was made on the web, taking the web pages of each actor involved as references.

Reviews of project reports provided by CCNIS and UNDP were also accessed.

In the interim, permanent contact and telephone interviews were maintained with CICA, CCNIS, and UNDP officials to obtain clarifications on the information gaps identified. WhatsApp and email were highly useful for channeling questions and answers.

Before the visit to the project site, questionnaires with open questions were designed in such a way as to allow space to establish a dialog with focus groups, in-depth interviews with key people, and on-site observation.

At the project site, meetings were held with three groups of women, establishing an open dialog with them. Families were also visited at their homes.

Annex 2. Photos and Videos

Links:

- Video: https://tinyurl.com/2tfb8esw
- Fountain: https://tinyurl.com/2dm4uchu

Annex 3. The project and SDGs

The project seeks to comply with the 2030 Agenda, specifically the Sustainable Development Goals, in the following ways:

Goal 7: "Ensure access to affordable, safe, sustainable, and modern energy," where a lack of access to energy can currently hinder efforts to contain COVID-19 at the community level, especially in Indigenous communities. Energy services are key to preventing diseases and fighting the pandemic; likewise, they generate opportunities for the development of family and community agriculture, putting Indigenous knowledge and knowledge into practice in their own food systems through irrigation systems.

Goal 10: "Reduce inequality within and between countries," Despite the existence of some positive indications toward the reduction of inequality in some dimensions, there are wide gaps for the fulfillment of Indigenous Rights in El Salvador, which is proposed in this initiative to improve living conditions in indigenous communities. The COVID-19 pandemic not only poses a challenge for health systems at the community level but also affects Indigenous cultural identity.

Goal 11: "Make cities more inclusive, safe, resilient, and sustainable." Although cities and metropolitan areas are the nerve centers of economic, social, and political growth, very limited measures are carried out at the state level to generate development at the rural level, with much less or no response to the needs of the communities of the Indigenous Peoples in El Salvador. For this reason, we established this initiative to create access to technologies that strengthen Indigenous communities as a pilot experience ■

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HONDURAS

Mini Community Hydroelectric “Puca Opalaca” in Plan de Barrio and El Zapotillo, Opalaca Biological Reserve

Author: Dennis Mairena Arauz

1. Brief Background

Description of the area

The population of the **Lenca Indigenous Peoples** in Honduras is 100,000, and more than 37,000 in El Salvador. The Lencas live in the Departments of Intibucá, La Paz, Lempira, and the south of Santa Bárbara, as well as the center and south of the Department of Francisco Morazán and the Department of Valle, where they border with the Lencas of El Salvador. The local communities of **Plan de Barrios** and **El Zapotillo** and the micro dam project are located within the Opalaca Biological Reserve[1].

The Opalaca Biological Reserve spans 50 kilometers (km) in length and 5 km in width. It is an important source of water generation and is the head of the important Lempa River in Honduras.

Plan de Barrios and El Zapotillo are withing int Opalaca Biological Reserve in the Department of Intibucá.

1 The National System of Protected Areas of Honduras (SINAPH) comprises 97 protected areas in different management categories and with different flexibility in the occupation and use of their resources. The Opalaca Biological Reserve is one of the 22 biological reserves declared within the SINAPH. It has an area of 26,409,806 ha and is subdivided into a core zone and a buffer zone.

San Francisco de Opalaca
2016 Data

12,315
INDIVIDUALS

23
COMMUNITIES

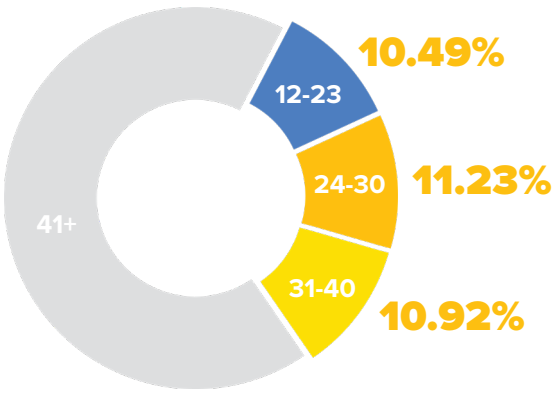
8
VILLAGES

5
NEIGHBORHOODS

49%
FEMALES

51%
MALES

4.71
AVE. PEOPLE
PER HOUSEHOLD



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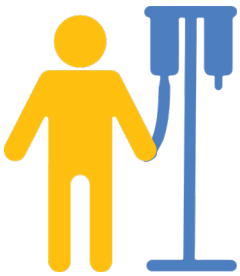

RESPIRATORY INFECTIONS
37.4%

DIARRHEA
27.94%

SKIN DISEASES
9.6%

INCIDENCE RATE

36.65%
RECEIVE WATER BY AQUEDUCT

38.34%
WITH LATRINES

4.91%
HAS SANITARY SERVICES

6.3%
HAS ACCESS TO ELECTRICTY

5%
USE SOLAR ENERGY SYSTEMS

2.86%
HAS PUBLIC LIGHTING IN GOOD CONDITION

99.86%
USE FIREWOOD FOR COOKING

0.09%
HAS FIXED TELEPHONY

23.24%
HAS CELL PHONE

The municipality of San Francisco de Opalaca had a projected population of 12,315 inhabitants for the year 2016, all within the rural area. This population is distributed across 23 communities, eight (8) villages, and five (5) neighborhoods. Its population comprises 49% females and 51% males, with an average of 4.71 people per household.

The largest segment of the population is young, with 10.49% aged 19 to 23, 11.23% aged 24 to 30, and 10.92% aged 31 to 40. Among the diseases with the highest incidence rates, respiratory infections have the highest incidence, affecting 37.43% of the population, followed by diarrhea at 27.94%. Skin diseases are less common, affecting approximately 9.6% of the population.

San Francisco de Opalaca faces significant challenges regarding basic infrastructure and services. A substantial portion of the population lacks access to clean water, with only 39.65% receiving water service by aqueduct. Also, only 38.34% of the population has latrines, and 4.91% has sanitary services, posing significant public health risks. Only a meager 6.37% of the population has access to electricity, leaving the vast majority in the dark. It is interesting to see that 5% receives electricity from solar energy systems, 2.86% has public lighting in good condition, and 99.86% uses firewood for cooking. Of the telephone services, 0.09% of the population of the urban area has fixed telephony; on the other hand, 23.24% of the population of the municipality has a cell phone.

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The community[2]

The project was developed in communities (hamlets) called Plan de Barrios and El Zapotillo, both within the Opalaca Biological Reserve in the Municipality of San Francisco de Opalaca, Department of La Esperanza - Intibucá, Honduras.

Both communities have a population of approximately 204 homes, with an average of seven (7) inhabitants per home, for a total of 1,414 people. The population difference between men and women is minimal, with 51% male and 49% female, mostly a young population between 15 and 45 years old. Their agriculture is subsistence-based, focused on growing corn and beans for self-consumption. However, they also own small coffee plots, averaging half a hectare each, with the produce sold to intermediaries who come to the community.

Watch video: https://tinyurl.com/2rkafsaz

Plan de Barrios and El Zapotillo have 8 infrastructures:

- **3** schools
- **1** kindergarten
- **1** community center
- **2** hermitages
- **1** cultural center

2. Summary of the implemented REP-UNDP SGP Project

Project Overview[3]

Beneficiary: Red de Desarrollo Sostenible de Honduras (RDS-HN, *Honduras Sustainable Development Network Association* in English)

Area of work: Climate change mitigation

Donation amount: US$150,000

Co-financing in cash: US$24,060

This contribution arose from various civil society organizations like the Amigos de la Tierra (Friends of the Earth), Fundación Tierra Viva, and Honold Foundation. These funds have been mainly dedicated to training on the environment and development and buying solar panels.

Co-financing: US$20,483

This financing comes from the contributions of the labor of the community, which is registered and accounted for financially.

General Objective:

Improvement of the living conditions of the families of the community within the framework of Indigenous community energy autonomy; that is, the generation of hydroelectric energy to promote the integral and sustainable development of the Lenca community of Plan de Barrio, San Francisco de Opalaca, under a focus of resilience, environmental sustainability, and energy autonomy.

2.1 Brief Description of the Renewable/Community Energy Project

Before going into detail about the mini hydroelectric project in Honduras, it should be noted that this is a project amounting to more than US$800,000, and that the contribution of US$150,000 of the Right Energy Partnership with Indigenous Peoples (REP) and the Indigenous Peoples Major Group (IPMG) represents less than 25% of the total amount. This meant that the contribution of UNDP-GEF-SGP turned out to be seed capital and drew national attention, which meant that many other civil society actors and official government entities joined the effort, probably because the project was located in the Opalaca Biological Reserve.

2 From a phone interview with Mr. Salvador Zuniga, the community main leader.

3 GEF–SGP. Construction of a Hydraulic Component, Run-of-river Dam, and Machine Room for a Small Hydroelectric System in the Lenca Community of Plan de Barrio and Zapotillo, San Fco. Opalaca, Intibucá.
https://www.sgp.undp.org/spatial-itemid-projects-landing-page/spatial-itemid-project-search-results/spatial-itemid-project-detailpage.html?view=projectdetail&id=29303

The technical studies on the capacities of the micro dam were jointly conducted by the Sustainable Development Network of Honduras (RDS-HN), with technical support from the National Autonomous University of Honduras, Valle de Zulia. This implies conducting hydrometric, soil, precipitation, and river flow studies to determine the electric power generation capacities.

With IPMG funds, it was possible to build a curtain for the micro dam and place a part of the pipe. According to Mr. Salvador Zuniga, the Indigenous leader of the community, the project is 30% complete. The concrete curtain measures 15 meters in length and 3 meters in height.

Another part of IPMG's financial resources was directed to provide training on gender equality and climate change, management, and accounting, all of which seek to raise the profile and participation of women. Exchange visits were also made to other communities where the entrepreneurs already had financial autonomy and demonstrated sustainability in their businesses.

Now, additional financial resources are needed to build the machine house, buy the generator and its turbine, set up the distribution network, and buy and install the transformers, poles, and wiring with all its insulators and other accessories. At present, the indigenous energy company is negotiating a US$100,000 deal with the Honduran Secretary of Natural Resources before the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), a development agency promoting sustainable development, to advance the project.

Without any funding available, they cannot determine a timeline for filing for infrastructure work and when electricity generation could start.

2.2 How is it being managed?

The project was directed by a committee made up of the Indigenous Council of the Lenca Community, the Board of Trustees, and the Committee for the Construction of the Hydroelectric Power Plant. With the progress of the negotiations, the Committee for the Construction of the Hydroelectric Power Plant became the Electricity Company of the Autonomous Community. This company already has its legal status and is in the last official procedure that would allow it to operate nationwide.

To promote the company's formation process, a lawyer who previously worked with the community was hired to prepare the vision, mission, principles, and statutes. Once these steps were completed, the company registration was officially formalized.

However, it was RDS-HN that was selected as the executing technical unit to receive the financial and technical support of the UNDP-GEF-SGP. Established in 1994, this non-governmental, independent, impartial, apolitical, and non-profit organization seeks to promote sustainable development to generate social changes. RDS-HN uses various technologies as tools to manage and share information resources and strengthen institutional capacities and community. This organization is based in Tegucigalpa.

RDS-HN was selected by the community committee described above under a review process in which the UNDP participated. At that time, the indigenous energy company was not yet established; it lacked legal status and the capacity to manage funds. However, with its track record and internal organization, RDS-HN was well-positioned to take on the opportunity.

The following community instances are recognized by the municipal authorities, and their members participate in the decision-making processes of matters related not only to this project but also to matters that concern them as a community:

a. **Patronage**. Its function is to address development needs in the communities. It is an organization that manages higher-priority projects for the local population.

b. **The Community Round Tables for Citizen Participation**. Recognized by the Citizen Participation Law of Honduras, these tables are created at the local level by representatives of different sectors of society.

c. **Indigenous Title Council**. Its function is to fight for the natural assets and territory of each community with the support of its inhabitants.

d. **Judicial Facilitators**. They give talks to the local population of the community, promote conciliation, and seek to solve conflicts with citizen participation.

e. **The Parents' Association (APF)**. Its function is to ensure educational activities and social projects for the maintenance of school facilities.

f. **Church Pastoral Council**. Perform religious activities on the dates of festive celebrations in the community.

g. **Council of Elders of Vara Alta**. It ensures the conservation of the culture and tradition of the municipality and its contribution to decision-making in conjunction with the mayor and municipal corporation.

These organizations have joined this expanded initiative as partners and investors for the project:

a. Living Earth Fund
b. Secretary of Energy (national authority)
c. The National Electric Power Company (ENEE)
d. Indigenous Coordinator of Popular Power of Honduras (CINPH)
e. Municipality of San Francisco de Opalaca
f. Community Media Association of Honduras (AMCH)
g. National Autonomous University of Honduras – Valle de Sula –Machining Center (CIT) – UNAH.Over the last few months, work has been done on the design of the mechanical parts that the hydroelectric plant will carry. There are several prototypes in the designs and manufacturing for better efficiency of the turbines. All the designs are carried out with multitasking software for programming optimization and simulation that supports the entire manufacturing process of mechanical parts, in this case, turbines[4].
h. In October 2021, the Minister of Energy, Roberto Ordoñez, the National Coordinator of the Sustainable Development Network-Honduras (RDS-HN), Raquel Isaula, and the Coordinator of the United Nations Small Grants for Development Program (PPD), Hugo Galeano, conducted a supervision visit on the construction of the "Puca Opalaca" Mini Hydroelectric Power Plant[5].

2.3 Project Results: Benefits of the project to the community (Environmental, Social, and Economic)

2.3.1 Environmental benefits

a. Community awareness of energy use and its effects has clearly increased.
b. It generates conservationist behavior and increases the use of sustainable energy.
c. More knowledge about gender, biodiversity, and forests has been acquired.

2.3.2 Social Benefits

a. Local participation in the project has had positive impacts because it has allowed individual and collective self-esteem and capacity development in Indigenous communities.
b. Develop skills and capacity for future projects and initiatives.
c. The organization of the Indigenous Electricity Company of the Autonomous Community is a representative example of strong social cohesion.
d. It is a forum for expressing people's enthusiasm and interest in renewable energy.
e. Greater acceptance of new renewable energy technologies has been generated among the population.
f. This Indigenous town is now a symbol and source of pride and identity[6].

Gender approach

Note that the three components included the gender approach. Each structure of the project involves the participation of women, who are motivated to develop new initiatives that improve the living conditions of the population and the conservation of their natural resources.

4 University presence. 2021. UNAH-VS advances with the project of a microhydroelectric plant in San Francisco de Opalaca. https://presencia.unah.edu.hn/noticias/unah-vs-avanza-con-proyecto-de-micro-central-hidroelectrica-en-san-francisco-de-opalaca/

5 RDS."Puca Opalaca": a small hydroelectric power plant that switched to the life of the Lenca communities of Plan de Barrios and Zapotillo, in San Francisco de Opalaca https://portal.rds.hn/archivos/4845

6 Various studies have produced statistics on the benefits for communities derived from the development of renewable energy in specific areas. Many of them focus on economic benefits and include projects of various sizes and ownership models. See: Terry Flowers and Marguerite Kelly, "Wind Energy for Rural Economic Development" (NREL: US Department of Energy). 2005, and "Community Benefits from Wind Power". 2005.

3. Challenges, lessons learned, and opportunities

The biggest challenge at this time is to specify the financial contributions and offers of the various donors or participants to finish the project in 2023.

Among the challenges for the future, we can mention the risk represented by the advance of coffee-growing areas. In the Opalaca Biological Reserve, a change in land use is taking place because the natural forest cover is being destroyed by deforestation, and it is becoming a coffee-growing area. This means that, in addition to putting biodiversity at risk, water sources are being affected, which puts the water supply for the micro dam at risk.[7]

Another existing risk is related to forest fires in the buffer zone of the Opalaca Biological Reserve. These fires are very recurrent and do not allow the development of the natural regeneration of the forest and cause loss of biodiversity, deterioration of the basins, and alteration in the water cycle. With this, the flow of water to the micro dam could end up being at risk of not being enough.

4. Lessons Learned

a. This project started as a simple idea, which, when developed, became complex and expensive, with a large number of participants, diverse interests, and stakeholders.

b. When starting the organizational and consultation process on the idea of the project in the communities, they had a longer-term vision under the concept of sustainable Indigenous community development. To meet this objective, they created the Indigenous Electricity Company of the Autonomous Community. Therefore, some project funds were devoted to creating such a company. To this end, several meetings and workshops were held to define the company's statutes, define its membership, hire a lawyer to obtain its legal status, and register it properly.

c. With this innovative venture, the community sought to have a hybrid electricity supply system for 50 homes. This uses a mini dam and has access to the national electrical system network. The school and community center will benefit from this expansion.

d. The contribution in kind (labor) by the 186 families is motivating for other actors to join the project.

e. Although the RDS-HN received the funds, investment decisions were made jointly with the community board of directors.

f. The sense of ownership on the part of the community members has made this possible for the villages. Indigenous people put conditions on not letting others make decisions for them. Therefore, they are always in close communication with the RDS-HN officers.

g. The organization of the locality and leadership are fundamental elements for the success of the project.

h. Despite the long development time of the project, the community remains motivated and working, waiting for future results.

4. Recommendations

a. Strengthen the structure of the Indigenous Electricity Company of the Autonomous Community with elements of management, administration, accounting, and auditing.

b. Ensure social audit mechanisms in which the community assembly is the highest authority.

c. Work on procedure manuals, regulations, and service conditions of the energy system.

d. Take courses on facility maintenance and basic accounting for the collection of energy consumption rates.

e. In addition, consistent and continuous work must be done to protect water resources and the watershed.

f. Conduct feasibility studies for the installation of small power plants in other communities that present the conditions for their installation.

7 ILO. 2020. Working Paper No. 23. Central American Dry Corridor: An exploratory view of the context, reasons, and potential of a job creation strategy in Guatemala and Honduras. Dry corridor poverty and rural vulnerability are concentrated in the western, central, and southern areas of the country, known as the CSH (INVEST-H, 2014). This region occupies an area of 30,764 km2(27.23% of the national territory) and includes the territories of 14 departments. It is named for its low rainfall and pronounced dry season, which often causes water shortages for agricultural production and human consumption in general. Of the total area of this region, approximately 44% is forest, while 34% is destined for agricultural use (ICF, nd). Most small and medium producers cultivate for their consumption and the local markets. Their plots are generally located in mountainous areas with reduced access to water for irrigation, road infrastructure to transport their production, credit, production technology, improved seeds, tools, and basic inputs (INVEST-H, 2014).https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_744898.pdf

6. Annex

Energy development framework in Honduras.

Honduras is one of the poorest countries in the Latin American and Caribbean (LAC) region and has faced relatively slow poverty reduction in recent years. According to official poverty estimates, 48.3 % of Hondurans (around 4.3 million people) lived below the national poverty line in 2018[8].

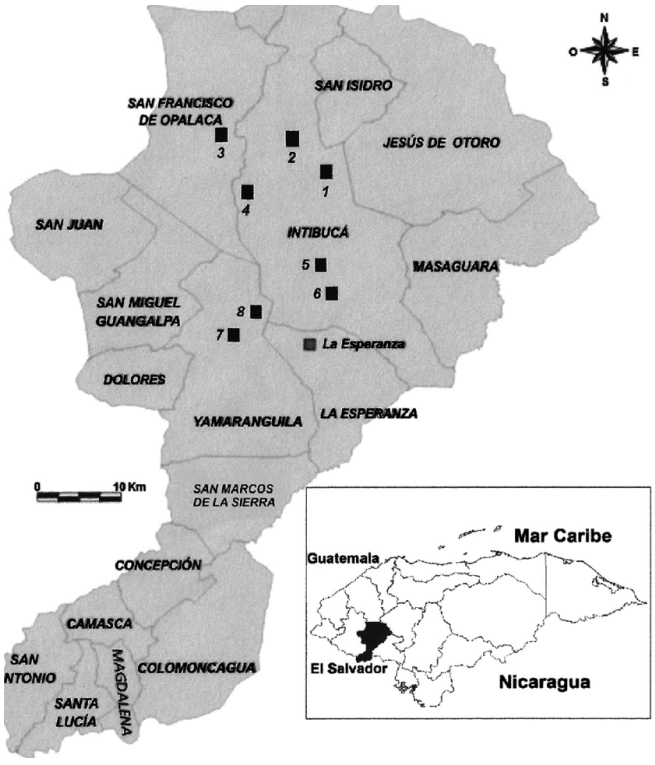
Approximately 28% of the country is agricultural land, and the agricultural sector employs approximately 39% of the population. Most of the agricultural area is devoted to the production of low-profit crops such as bananas, plantains, rice, corn, and beans. By 2014[9], it was estimated that 48% of the national territory was forest cover[10].

The installed capacity to generate electricity in Honduras increased from 532.6 megawatts (MW) in 1990 to 2,637.2 MW in 2018. During that period, there was an average annual growth of 5.9%; however, between 2010 and 2018, the growth rate was 6.4%, partly explained by the development of renewable energy sources (solar, wind, geothermal, and hybrid).

The participation of renewable sources in electricity generation increased from 43.5% of total generation in 2011 to 67% in 2018. By 2018, hydroelectric energy represented 35.7% of the total electricity generation in Honduras, while non-conventional renewable energies generated 31.3% of the country's electricity (CEPAL, 2020).

San Francisco de Opalaca Municipality

Map
San Francisco de Opalaca Municipality. La Esperanza Department – Intibucá. Honduras.



8 World Bank. 2020. Poverty and equity brief. Honduras. Retrieved from https://databankfiles.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Global_POVEQ_HND.pdf

9 IFAD. 2011. Enabling poor rural people to overcome poverty in Honduras. https://www.ifad.org/documents/38714170/39972349/Enabling+poor+rural+people+to+overcome+poverty+in+Honduras.pdf/d927f174-d4f4-4401-b0db-cdcb357f02c4?t=1517243260000

10 CCAD-GIZ Regional Program. 2014. Honduras Forest and Land Cover Map: Analysis of National Figures. Technical note no. 8. Forest monitoring.

For most of the school year 2020, schools were closed because of the COVID-19 pandemic, and the focus has been shifted to implementing the virtual modality. However, considering that the educational facilities and the homes did not have electricity, the students from the 320 schools received very limited education.

In the case of health, the Department of Intibucá has 61 health establishments, all of which have electricity.

Methodology

The methodology used to conduct this case study was qualitative, descriptive, and intercultural.

First, a search for secondary information was carried out on the web, referencing the web pages of each of the actors involved in the execution of the project. As a result, more information was obtained from UNDP, the RDS-HN association, and a little less from the municipality. No information could be found on the web regarding Indigenous organizations and their relationship with the project.

We also had access to reviews of project reports provided by UNDP and the Mesa Indígena de Energías Alternativas. Despite several attempts, no contact was made with the main Indigenous leader of the project. All interviewees were reserved when providing information.

In this attempt, contact was maintained, and telephone interviews were conducted with Consejo Indígena de Centroamérica (CICA) officials and personnel from the Association for Sustainable Development (ASD) to clarify the information gaps that were being identified. WhatsApp and email were very useful for channeling questions and answers.

The preliminary version of the study was reviewed by two IPMG officers, who answered and clarified their questions.

It was not possible to visit the project site because the Honduran Migration Office denied the consultant ■

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NEPAL

Indigenous-led Energy Solutions in Nepal: For Communities and the Environment

Author: Prabindra Shakya

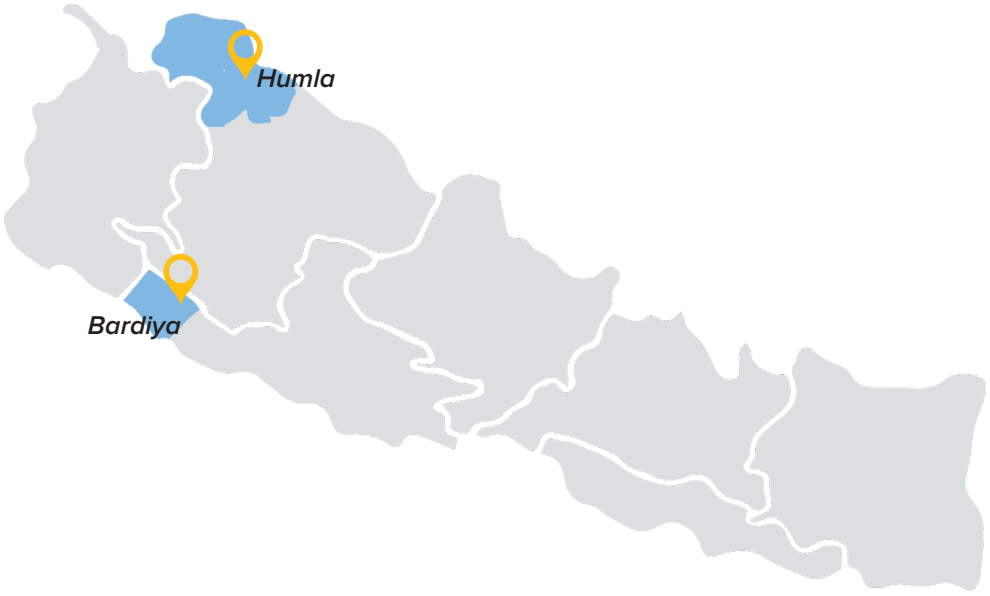
1. Background

As the global community moves to expand renewables and achieve universal access to clean energy, Indigenous Peoples are disproportionately disadvantaged by large-scale energy projects. Their territories often host renewable energy projects, but their human rights are continuously violated, and communities have suffered displacement, conflicts, and the destruction of livelihoods. At the same time, they are in danger of being further left behind. Indigenous Peoples are a critical demographic in terms of energy access and suffer invisibility as a group despite their territories hosting some large hydropower and other renewable energy projects. Thus, Indigenous Peoples are also developing, implementing, and managing community-led or community-based energy projects to meet their energy needs.

To support community-led/based renewable energy projects of Indigenous communities to address their need for access to energy, the Right Energy Partnership with Indigenous Peoples (REP) has partnered with the United Nations Development Programme (UNDP) through their Global Environment Facility (GEF) Small Grants Programme (SGP). The REP-UNDP SGP has been piloted in El Salvador, Honduras, Cambodia, Nepal, DRC, and Cameroon.

In the above context, this document includes case studies of the following two community-led energy projects implemented in Indigenous communities in Nepal under the GEF Small Grants Program:

1. ***Supporting Indigenous Practices and Entrepreneurship through Promotion of Renewable Energy Technology in the Indigenous Community of Bardiya*** in Southwestern Nepal
2. ***Women Light the World*** in the remote Humla District in Northwestern Nepal



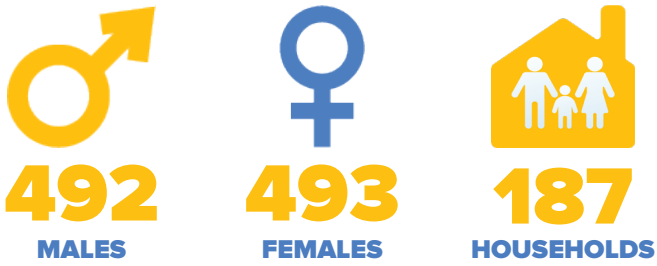
Energy project were implemented in the Humla district of Karnali Province and in the Bardiya district of Lumbini Province.

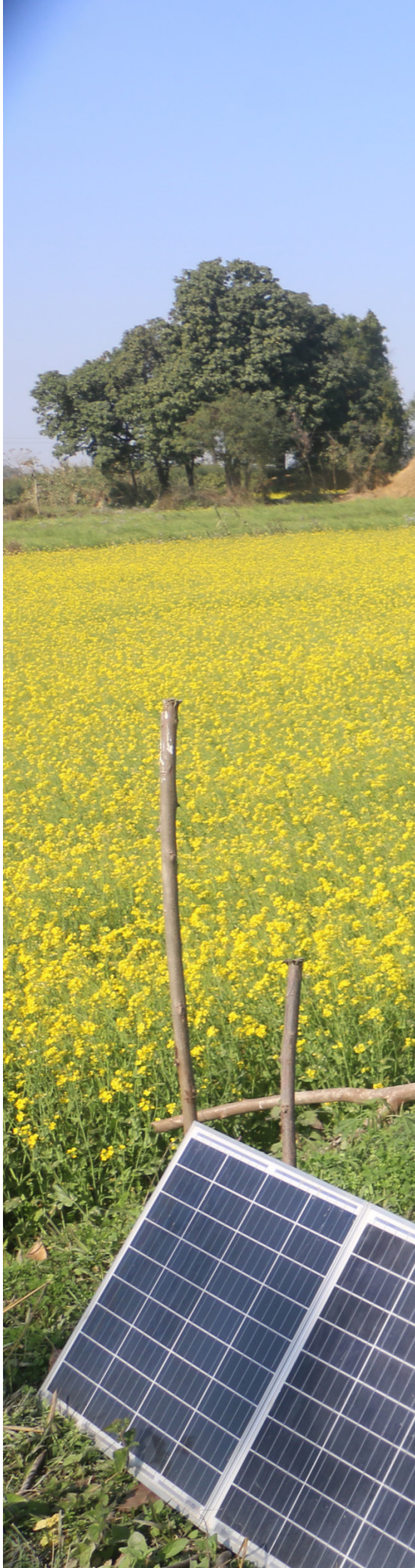
The REP commissioned the case studies to examine the best practices and experiences on the implementation of renewable energy projects, which are developed, managed, and executed by Indigenous communities, including women and youth in their territories. The aim of this study is to highlight alternatives to energy solutions that are developed and managed by Indigenous Peoples, which are consistent with their self-determined needs and development aspirations, and to empower Indigenous communities, who are managing these energy solutions by documenting, recognizing, and promoting such solutions. The case studies accordingly include the best practices, lessons learned, and recommendations for funders, governments, and private actors to recognize these solutions in each of these countries' national energy policies and are not meant to be an evaluation of the projects themselves.

The case studies are produced through desk reviews of the project documents, including the Memorandum of Agreements signed between the SGP and the project implementers, implementation reports of the project, online news, and other relevant reports, and interviews with key informants, including representatives of the project implementers. Additionally, for the case study of the project in Bardiya, group discussions with the members of the communities, interviews with key informants, including community leaders and women, and photo documentation and photo documentation on the ground were carried out.

About Indigenous communities

In **the Bardiya** district of western Nepal, the project was implemented in Bargadahi village in Ward No. 2 of the Rajapur municipality. The district is populated mainly by people belonging to the Indigenous Tharu group, and the Bargadahi village is no exception. According to the project proposal, 187 households with 492 males and 493 females are in the project area. Their main occupations are agriculture, including vegetable farming, and animal husbandry, including poultry, goat, and fish. Many people also migrate to India or other parts of Nepal to work and send money back home. Furthermore, Tharus are rich in Indigenous knowledge and practices, such as making *Delwa*, *Dhakiya*, *Bakhari*, *Chhatri,* traditional Tharu dresses, and other handicrafts, as well as farming traditional produce (*tharu*, a special potato variety; *Anndi Chichar*: a rice variety also used for making wine).





Tharu is one of the officially recognized Indigenous nationalities[1] of Nepal. They are the second largest Indigenous group in terms of population – more than 1.7 million people, accounting for 6.6 % of Nepal's total population as per the 2011 census. They are native to the southern Terai plains of the country, which is Nepal's rice basket. Isolated from outsiders by the dense malarial jungle, they developed self-sufficient societies with distinct languages and dialects, religions, and cultures that differed from the hill peoples. Following the formation of modern Nepal in the late 18th century, members of the ruling families received land grants in the Terai. They were entitled to collect revenue from those who cultivated the land. Mainly, after the eradication of malaria in the late 1950s, many Tharus lost their lands to the large influx of hill migrants, mainly from Hindu "high" caste groups, into the Terai and were eventually even forced to work as bonded laborers (*Kamaiya/Kamalari*).[2] Although the Government of Nepal abolished the *Kamaiya* system in July 2000, it has been unable to rehabilitate many *Kamaiya* families effectively.

A lack of representation in government and politics, language barriers, and access to state protection and services, including education, perpetuated Tharus' marginalization.[3] Accordingly, Tharu constitutes one of several Indigenous groups that are historically discriminated against in Nepal and is officially categorized as a marginalized Indigenous group. Tharus have their own customary governance system known as *Badghar*, through which their rituals, festivals, and other social affairs are regulated, which still exists today in many communities.[4]

The **Humla** district of far western Nepal, where the second project was conducted, is one of the most remote districts of Nepal. Sharing its borders with Tibet, the district is inhabited by approximately 50,000 people (according to the 2011 census), who face frequent problems of food insecurity, lack of health care, basic education, and access to clean renewable energy. The region's government-mandated development of energy infrastructure and road connections is slow. The district was only recently connected to the country's formal road network,[5] and it might take years before the inhabitants of these remote areas get a reliable supply of electricity.

1 Indigenous peoples are officially known as indigenous nationalities (Adivasi Janajati) in Nepal. See the National Foundation for Development of Indigenous Nationalities Act, 2002

2 World Organization Against Torture (2006). "The Kamaiya System of Bonded Labour in Nepal". A study prepared by the World Organization Against Torture for the International Conference on Poverty, Inequality and Violence: is there a human rights response? Geneva, 4–6 October 2005.

3 OHCHR (2008). "Conflict-related disappearances in Bardiya district". https://nepal.ohchr.org/en/resources/Documents/English/reports/HCR/2008_12_19_Bardiya_Report_Final_E.pdf

4 Indigenous Voice. "Who is Tharu?" https://english.indigenousvoice.com/tharu

5 Kathmandu Post (2022). "United Kingdom hands over Mugu-Humla link road to Nepal". https://tkpo.st/3YqxOJ9

NUMBER OF HOUSEHOLDS IN HUMLA SELECTED FOR SOLAR ELECTRIFICATION

TORPA*	BARGAUN	BARUNSHE	TOTAL
34	81	81	220

** Torpa received 10 more solar units than the proposed 24.*

As per the project proposal, 210 households were selected from three villages – Torpa (24 households), Bargaun (81 households), and Barunshe (105 households) – of the district for solar electrification, while the project eventually installed solar home lighting systems in 220 households (10 more than proposed in Torpa village); 195 of them identify as Indigenous Bhote (listed in Nepal's census as Tamang) people, and 25 households were of the so-called low-caste Hindu Dalit groups.[6] In the past, government documents reportedly identified the Bhote as "Bhotia," meaning Tibetan, and later, to affirm their Nepali nationality, they became classified as "Tamang," the ethnonym of the Tibetan–Burman hill people from central Nepal.[7]

Indigenous Bhote number 13,397 as per the 2011 census of Nepal and are spread in the mountainous Himalayan areas of the far-western, mid-western, and western districts of Nepal. They have a religion, language, traditional attire, and culture similar to Tibetan Buddhists and engage in trade and animal husbandry as their main occupation. They are officially recognized and categorized as a marginalized Indigenous nationality of Nepal. Extensive studies on Indigenous Bhote people, who are reportedly also called Bhotia/Bhotiya, are lacking compared with those of other Indigenous Peoples. The term "Bhote" is also used (often derogatorily in the majority language) to refer to Mongoloid peoples of Tibetan descent.

About the projects

Project implementers, objectives, and costs

In Bardiya, the project was implemented by the United Youth Community (UNYC Nepal), which is a local non-profit, non-governmental, grassroots, and services-oriented NGO established in 1995 with the primary objective of improving the living standard and socio-economic development of the people of Bardiya district and Nepal as a whole through community development and micro-finance programs. Their focus is on the Indigenous Tharu, Dalit, and other poorest people. Furthermore, their programming thrust has been awareness building, need assessment, and implementation through people's participation and empowerment for sustainable community development. In more than 20 years of existence, UNYC Nepal has successfully implemented over 50 projects in partnership with various international NGOs/projects, donor government institutions, and UN entities, including the GEF SGP.

6 Online group interview with the Project Coordinator and the Barefoot College representative on April 10, 2023

7 Facts and Details. "Tibetan-Nepalese (Bhote Group)". https://factsanddetails.com/south-asia/Nepal/Ethnic_Groups_and_Minorities_Nepal/entry-7871.html

To carry out the project, UNYC Nepal collaborated with the Center for Rural Technology, Nepal, an organization with more than three decades of experience and expertise working with rural communities and integrating renewable energies for sustainable development.

The project was designed to address the following problems identified by UNYC Nepal in the project village/area:

- Lack of irrigation facilities to meet the high demands of local rice, potatoes, and vegetables during the dry season;
- Lack of clean cooking methods that make cooking a demanding task for women;
- Lack of ability to meet the demands of locally produced *Duna Tapari* (leaf-based plates) due to the manual production of these plates;
- absence of modern methods for dry medical herbs, which results in a longer process; and
- Use of chemical pesticides and fertilizers that damage farmland, the environment, and human health.

The project thus aimed at installing various renewable energy technologies, such as solar pumps for irrigation, improved cooking stoves and biogas for cooking, and solar dryers for processing medicinal herbs in the community to meet the energy demands of household and agricultural activities. The objective was to promote and support Indigenous entrepreneurship activities through capacity building and other support in the mechanization of *Duna Tapari* production as well as in the use of bio-fertilizer and climate-smart technologies (such as drip irrigation) for commercial farming. Finally, the project also aimed to link the community with local financial institutions for financing, if needed, the use of renewable energy technologies, the development of entrepreneurship activities, and the promotion of local Indigenous products.

The total cost of the project was US$51,090.91. Of that, US$32,000 came from the GEF SGP, more than half of which was used for the equipment/materials for the renewable energy technologies supported under the project.[8] The rest of the project cost was budgeted from other sources through cash or in-kind contributions as follows:

- Community contribution from beneficiary households for the total amount US$ 2,954.55 (US$2,727.27 of that in kind);
- UNYC Nepal for the amount of US$ 9,545.45 (US$5,454.55 of that in cash); and
- Unique Nepal Laghubitta Bittiya Sanstha Ltd (UNLBSL), a local microfinancial institution, as another co-financier, for US$6,590.91 in cash through loans.

The project started in May 2021 and was completed one month later than the foreseen period of 18 months, primarily because of the COVID-19 pandemic.

8 Group interview with the officials of UNYC Nepal on January 24, 2023 at the UNYC Nepal office in Rajapur.

In **Humla**, the project was implemented by a local non-profit, public service-oriented, non-governmental organization, the Bodhi Tree Foundation Humla, in cooperation with the Barefoot College of India and Women Light the World based in the USA. Established in 2014 and working in Humla since 2004, the Bodhi Tree Foundation's long-term initiative is for the socio-economic upliftment of the high Himalayan (Karnali) region by promoting community-based development programs in the fields of women empowerment, health, education, water, and sanitation.

Barefoot College International is a blended social enterprise that provides services and solutions to the challenges facing poor rural communities to make them self-sufficient and sustainable, valuing and respecting the knowledge and wisdom they already possess. The Barefoot solutions can be broadly categorized into the delivery of solar electrification, clean water, education, and livelihood development, whereby the College has been and is fully committed to empowering women as change agents, entrepreneurs, and environmental stewards. It is one of the only India-based NGOs whose programs have been expanded and exported throughout the developing world, with operations in 94 countries globally and 15 states in India today. It works with more than 96 ground partner organizations ranging from small Indigenous NGOs to large global NGOs and multilateral organizations.

Women Light the World is a US-based non-profit organization established in 2018. Its mission is to educate and empower women to be agents of transformative change in their communities, mainly by educating them on the use and management of renewable energy solutions.

The project was part of a broader initiative for women's empowerment and solar electrification in the Humla Valley, which is claimed to be the largest such undertaking in the Karnali region, to mobilize a diverse global network of organizations from NGO, government, and corporate sectors to provide more than 30 women from 28 villages with education and support to deliver solar electrification to their own villages for approximately 1,265 households. The multi-stakeholder alliance for the project also includes the Mega Bank and other organizations.

The project's specific objectives were as follows:

a. Empower three women from the three villages of Humla by training them to become solar engineers.

b. Electrify 210 households in the villages by delivering solar equipment to solar engineers, who will install the equipment in the households.

c. Form local energy committees to manage household contributions for repair and maintenance of solar equipment and establish rural electronic workshops for community learning space on solar engineering.

As per the project budget, the amount of the grant requested from the GEF SGP was US$50,000 off the total project cost of US$108,556.86, while the project expenditures were projected at US$86,467.48. The grant from the GEF SGP was primarily used to cover the costs of the equipment/ materials for solar electrification.[9] The remaining costs were proposed from other sources as follows:

- Community contribution in cash for the total amount of US$ 2,089.38 at the rate of NPR 100 (US$ 0.74) per household per month, which was stated as an ongoing contribution for the stipend of the three women and replacement of batteries in 6-8 years;
- Contribution from the Ministry of External Affairs of India in cash and on bills of US$ 36,427.65; and
- Individual donations for the amount of US$ 20,000.

The project was implemented over one and a half years between November 2021 and December 2022.

"The solar pumps and drip irrigation systems have doubled our production and accordingly increased our income."

Energy solutions and project results

In **Bardiya**, the project involved the use of a range of renewable energy technologies. The technologies were demonstrated and explained to the community at a program organized by UNYC Nepal with the project's technical partner. Following the technical assessment/feasibility of the technologies, the community needs or demands of the community members were assessed. Accordingly, the project addressed the demands for energy solutions in line with its targets as follows:

1. **15 solar pumps were installed for households in Bargadahi village engaged in vocational vegetable and fish farming; 11 of them were also supported with a micro (drip/sprinkler) irrigation system for commercial vegetable farming.**
2. **Improved cooking stoves were installed in 50 households in the village.**
3. **12 households in the village were supported with biogas plants (against the original target of ten).**
4. **Solar dryers were provided to ten Gurwa/Vaidyas (Tharu traditional medicine practitioners, also called Baidawa) in the Bardiya and Kailali districts.**

In informal interviews and a group discussion with the beneficiaries of the solar pumps, the community members informed that the solar pumps and drip irrigation systems have doubled their production and accordingly increased their income. In addition to partial grants to cover most costs of the pumps and irrigation systems received under the project, they were provided technical training on the usage and basic maintenance of the pumps. The pumps have been particularly useful for the dry season when the irrigation canals dry up and for fields further away from those canals. Specifically, women have also benefitted by using the pumps to save time for vegetable farming and animal husbandry and fetching water for cleaning and washing. As one of the beneficiaries said, **it only takes an hour to irrigate farmlands that used to take all day** – those who did not take the pump under the project are now regretting[10].

9 Supra note 6

10 Informal interviews with two beneficiaries (one male and one female) and group discussions with seven beneficiaries (two of them women) were conducted on January 23, 2023 at Bargadahi village

Similarly, the representatives of the households that were supported with improved cooking stoves under the project, in another group discussion[11], elaborated on various benefits of using the stoves as follows:

- **The stoves have led to 50% less cooking time and** convenience in cleaning dishes. They also keep the food warm. As a result, women have more time to work in the field or perform other chores.
- Men have been encouraging their spouses to buy improved stoves. Earlier, because of heavy smoke from stoves, they would not even come to the kitchen, which also used to be very hot. In some families, **men also cook more**.
- Few families have even given up on LPG stoves to cook in improved stoves with firewood collected after every rainy season as they do not use much firewood.
- **Less smoke from the stoves has also resulted in improved health and well-being in the families**, particularly for women, with reduced complaints of burning eyes, cough or breathing, and lung problems.

Two Indigenous Tharu women from the village were trained over three days by a technical service provider to install the improved cooking stoves under the project. One interviewed for the case study had installed at least 45 such stoves in the village by herself after the training.[12] She expressed happiness for the additional income that she could earn by installing the stoves – the labor cost that the beneficiaries pay for the stoves. UNYC Nepal has reportedly also trained the beneficiaries on the repair and maintenance of stoves and continued providing support for installing improved stoves in additional homes for a total of 100 households beyond the project objective.

Further, in conversations[13] with two Gurwa/Vaidyas (Tharu traditional medicine practitioners) who received solar dryers under the project, it was learned that **the solar dryers had been immensely helpful for drying medicinal herbs in less time and more safely than traditionally done under open sun. They have also been useful in storing herbs for longer, as direct sunlight is not good for some herbs, and has helped increase the quality of the medicine.** As a result, they have been of great aid to the Gurwa/Vaidyas, who reportedly provide extensive health services to the local Tharus and even non-Tharus from farther villages.

The Gurwa/Vaidyas use traditional Tharu medicinal knowledge and ayurvedic medical practices from India while they grow the herbs themselves or collect them from the nearby forest and process them on their own. They even offer accommodation for patients who come to their house, charging only a minimal fee for the medicine. They treated several diseases, from gastritis, kidney stones, epilepsy, and even paralysis. One of them claimed to have cured 70-75 paralysis patients over the past year. The other, who has been offering traditional medicine as well as yoga services along with his wife, has even provided health services to foreigners and was pleased that his sons were going to continue his practice.

Furthermore, under the project, UNYC Nepal distributed more than 3,600 fruit seedlings to Bargadahi villagers. They planted the seedlings in their kitchen garden under the "one house, one tree" program, which was also carried out better than originally planned, as every household was given three seedlings of mango, litchi, and timber, which are considered high-value plants. Those involved in vegetable farming were provided training on organic vegetable farming using slurry management, vermi-composting, and the use of biofertilizers and biopesticides such as "Jholmal". They were also trained on commercial farming practices such as plastic tunneling and mulching. Village leaders and project beneficiaries were also linked with local financial institutions to address their financing needs. A school camp was organized at a local school to raise awareness among students and teachers about the significance of renewable energy technologies in the context of climate change and its impacts. This created an eco-club of students to conserve the environment through awareness in the school and the community.

11 Group discussion with 13 beneficiaries (twelve of them women) was conducted on 23 January at Bargadahi village

12 Interview conducted on 23 January 2023 at Bargadahi village

13 Interviews were conducted with Gurwa/Vaidyas at Rajapur municipality, Ward no. 1 on 23 January 2023 and at Thakurdwara municipality, Ward no. 9 on 24 January

In **Humla**, **the project electrified 220 households, with more than 2,100 beneficiaries, in three villages** with 40-watt solar home lighting systems, which included solar panels, a 40-ampere hour (Ah) battery, 4 LED lamps, a charge controller, one lantern, and a multi-charger. In addition, **three community facilities (health centers and rural municipality office) were electrified.** The systems were installed by **three (one from each of the three project villages) indigenous women, so-called solar mamas**, with no formal education after they were **trained over six months in solar engineering** at Barefoot College in India through the "learning by doing" approach. There, the women also had cultural exchanges with women from other countries/regions and learned about women's rights, health and safety, and environmental stewardship, as well as about using social media, sewing, and other skills.[14]

The project **formed Village Environment Committees for ground-level implementation of the project at the village level to ensure sustainability of the lighting systems**, whereby the households pay a certain amount every month for the fees of the "solar mamas" for necessary repair and maintenance of the systems. The project also **set up a renewable electronic workshop where community members can repair lighting systems**.

As per the baseline and online surveys carried out by the project partners among hundreds of beneficiaries of the three villages,

- More women (almost 86%) have started using livelihood skills for income generation after electrification compared with 17% before.
- Candles and kerosene lamps were previously used by 5% and 13% of the beneficiaries as light sources, respectively. None of them were using them anymore, with a monthly savings per family of about INR 474 (US$5.63). The use of battery lights decreased from 100% to 21% of the beneficiaries.
- 63% of school-going children were studying in the morning to complete their home before, 99% of them preferred to study in the night after electrification.
- 97% of families were satisfied with the brightness of the light sources used for house chores. Before the project implementation, none of them were satisfied with the results.
- 97% of families reported a decrease in black smoke from light sources (such as candles and kerosene) in the house, with a consequent decrease in related medical diseases (mostly respiratory ones and irritation of the eyes).
- Women were further empowered as their percentage participating in community consultations increased from 32% to 79%. In addition, more women solely or jointly take part in the decision on household expenditures (rising from 17% to 52%).
- Last but not the least, positive impacts on the environment and social-economic welfare were recorded: 188 metric tons of CO_2 emissions were avoided over the lifetime of the solar products, and 1,552 people were given improved energy access cumulatively.

14 UNDP. "Honor the action". https://undp.shorthandstories.com/gef-sgp-honor-the-action/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Paris

Furthermore, according to a case study published by the project partners[15], children have reported studying three times longer than previously with solar-powered lights, along with improvement in their grades and a boost in their drive to continue studying, particularly for girls, who are most likely to drop out. At the same time, trips to the city to purchase more fuel are eliminated as a 99% reduction in kerosene use was reported, saving people time and money. Disaster response and mitigation strategies are implemented because solar electricity is far more reliable in poor weather conditions.

Project management: ownership and financing model

The project in **Bardiya** was implemented by UNYC Nepal, a local NGO composed of all Indigenous Tharus. UNYC Nepal had previously supported biogas plants and improved cooking stoves in the district, among other relevant projects. It designed and executed the project with a technical partner who had also implemented renewable energy projects in other parts of Nepal with support from the GEF SGP.[16]

Although UNYC Nepal largely managed the project, it was evident during the field visit that it closely collaborated with the communities in Bargadahi village through the *Badghars* (customary Tharu leaders) in decision-making about project implementation. A user committee was reportedly formed for the project with the participation of the *Badghars* of the village for gathering villagers for the meetings and events under the project and particularly for the identification of beneficiaries.

The traditional roles of *Badghar* in the Tharu community include leading the community members in performing socio-cultural affairs such as marriage and funerals, collective economic undertakings such as cleaning irrigation canals, and resolution of minor disputes. In line with these roles, *Badghars* played a crucial role in calling meetings/gatherings and mobilizing villagers for them as well as in information dissemination under the project. As shared by the Badhgars interviewed for the case study, while there are challenges with the participation of women in the *Badhgar* system of the village due to lack of education and shyness among them despite encouragement for their participation, beneficiaries of the project significantly involved women in both the improved cooking stoves and solar pumps, as seen in the discussions for this study. Nonetheless, it was found that the system has been democratically practiced until now. *Badghars* were selected every year through village/sub-village gatherings, and meetings of *Badghar* system officials were held periodically, with emergency meetings held as needed.[17] The involvement of *Badghars* in managing the project was the highlight of the project for ensuring community (co-)ownership over it and significantly contributed to its success.[18]

Ownership of the renewable energy solutions implemented under the project, such as solar pumps and drip/sprinkler irrigation systems, improved cooking stoves and biogas plants, and solar dryers, rests with the individual beneficiary/family. Nonetheless, in their group discussion, the beneficiaries of solar pumps for vegetable farming and aquaculture affirmed the need to form collective/cooperatives for commercial production, including establishing vegetable and fish collection centers in the village to take them to the markets.[19] *Badghars* of the village also indicated such needs in the communities.

In **Humla**, the Bodhi Tree Foundation, a local Indigenous-led NGO, was responsible for local coordination and implementation of the project, and international NGOs played a key role in designing and executing the project. Nonetheless, as stated above, the project formed committees at the village level called the Village Environment Committee for ground-level implementation of the project, including the determination of monthly payments for the solar home lighting system installed under the project and collection thereof from the households for the sustainability of the systems. It can be said that such committees provided a strong community (co-)ownership over the project even though the lighting systems were owned by each household.

Regarding the financing model, both projects used a co-financing model through community contributions as well as raising funds from other sources besides the GEF SGP and the internal resources of the project implementers. Under community contribution, the beneficiaries were required to pay minimal costs for getting the energy solutions that helped to build ownership of the beneficiaries over the equipment provided, while government rebates/subsidies were also mobilized or sought.

15 Barefoot College International et. Al (2022). "Laiku Lama – Solar Mama of Nepal Trained in India in 2018". https://www.barefootcollege.org/wp-content/uploads/2022/03/NepalCaseStudyFinal.pdf
16 Supra note 8
17 Group interview with two Badghars of two toles of Bargadahi village with the Deputy Badghar of Tanna Bargadahi (lower tole) on January 24, 2023 at Bargadahi village
18 Supra note 8
19 Supra note 10 and Ibid..

For example, **in Bardiya**, UNYC Nepal required beneficiary households with improved cooking stoves to pay labor costs of NPR 500 (US$3.71) or NPR 1,000 (US$ 7.42) to the Indigenous Tharu women who installed the stoves that were given for free.[20] Similarly, the beneficiaries of solar pumps were made to pay minimal costs for the hose (water pipe). They were able to mobilize a government subsidy from the Alternative Energy Promotion Center for the equipment of the solar pumps, improved cooking stoves, and biogas plants, while they also mobilized some co-financing from local micro-finance institutions.[21]

In **Humla**, while the beneficiary households received the solar home lighting systems for free, each beneficiary household was charged NPR 500 (US$3.71) to pay the "solar mamas" who made the charge controller themselves while they paid NPR 100 (US$0.74) monthly for repair and maintenance fees when needed. While the local NGO tried to get a tax exemption for the equipment, they could not get it, or at least not in full, due to documentation challenges for the government procedures for such an exemption.[22]

Challenges, lessons learned, and opportunities.

The two projects faced some common and differentiated challenges, based on which lessons can be drawn. At the same time, the projects indicate various opportunities for promoting indigenous-led energy solutions.

For both projects, the implementers, particularly the local NGOs, pointed toward the challenge in coordinating and collaborating with the authorities – local or national – to mobilize government support, including applicable subsidies or tax rebates for equipment, for such Indigenous-led energy solutions due to complex government procedures. Although UNYC Nepal in Bardiya could obtain subsidies from the Alternative Energy Promotion Center for the equipment they provided under the project through their technical partner, they did not collaborate with the local government to avoid another long and complicated procedure at the local level. UNYC Nepal representatives felt that such collaboration would have been important for the greater effectiveness of the project.[23] On the other hand, the Bodhi Tree Foundation Humla faced significant documentation challenges in facilitating logistics of some of their equipment for solar home lighting systems from India and getting tax rebates on them, although some NGOs are provided such tax exemptions. They eventually procured the batteries and solar panels locally while the "solar mamas" made the charge controllers themselves. They also reported challenges with obtaining project approval from the Social Welfare Council – the federal authority that oversees NGOs, including foreign grants to them – due to complex bureaucratic procedures.[24] Various NGOs have frequently and widely reported challenges with the requirements and procedures of the Council, which incur significant costs for project approval as well as monitoring and evaluation by the Council.[25]

The high cost of renewable energy technologies that are not affordable to Indigenous communities is another challenge. More innovations and mainstreaming of these technologies are required to reduce their costs. While costs for solar panels and associated equipment are reportedly cheaper in

20 Supra note 12
21 Supra note 8
22 Supra note 6
23 Supra note 8
24 Supra note 6
25 Kathmandu Post (2021). "Social Welfare Council to monitor all projects run by Nepali non-governmental bodies". https://tkpo.st/2OSA5gH

India than in Nepal, which is why UNYC Nepal procured their solar pumps from a vendor across the border in India, Nepal's government should take effective measures to make such equipment available at affordable costs within the country itself. At the same time, Indigenous communities and their organizations or support groups lack resources, particularly flexible funding, to explore the wide range of technologies available and determine what best suits their context. In the absence of funds, the project in Humla had to mobilize funds from a multitude of donors, including individual donations.

At the same time, the communities lack technical knowledge about a range of renewable energy technologies. Often, various modifications of the technologies could reduce costs, depending on the appropriate technical partner or service provider/vendor. This was particularly the case for UNYC Nepal in Bardiya. They expected more support from their technical partners, including awareness-raising and capacity-building of the communities under the project. Also, only later in the project did they learn about a locally produced improved cooking stove, which was easier to install and cheaper than the equipment for which the Tharu women were trained by an international expert. Subsequently, they immediately switched to a locally produced improved cooking stove.[26] Delays in project implementation due to the restrictions caused by the COVID-19 pandemic were another common challenge for both projects.

Furthermore, as found in Bardiya, Indigenous communities still lack even basic awareness of the advantages of using renewable energy technologies. This was evident in the discussion among the beneficiaries of improved cooking stoves, whereby they informed that still more than half of the households in the village have not yet installed improved cooking stoves – not only because of costs but also because of misbeliefs that such stoves can cause fire or get snakes to get in the house, etc. In the interview with the Tharu woman who is installing stoves, she also pointed to the lack of full support for women like her to engage in such work. Thus, a lack of further women empowerment is still required, although the role and participation of women are significant in both the projects studied in this document.

Additionally, though the project in Bardiya aimed to promote Indigenous entrepreneurship through the mechanization of producing traditional products such as *Duna Tapari,* UNYC Nepal learned that such products would not be competitive in the markets. Thus, they dropped the idea after their market research and cost analysis. UNYC Nepal stated that they have also been facing the challenge of promoting Indigenous entrepreneurship through commercial farming among Tharus, who have primarily been living off subsistence farming. Lack of entrepreneurship skills among Indigenous communities and support to build those skills also pose daunting challenges to ensure that Indigenous communities can make the best use of the energy solutions provided to them to not only access energy but also use it for improving their livelihoods and lives.

The challenges discussed above also point to various opportunities to promote Indigenous-led energy solutions, such as the availability of a wide range of renewable energy technologies that can be useful for Indigenous communities, the existence of government subsidies and tax rebates for using those technologies, and innovative fundraising approaches that can be drawn on. Gradually improving road access to remote Indigenous communities also provides an opportunity to bring energy solutions to those communities. Road access has also increased access to the market for Indigenous communities, which is a pre-requisite to building Indigenous entrepreneurship, while additional training on skills development is required.

Additionally, linking the energy solutions of Indigenous communities not only to their improved livelihoods but also to wider environmental conservation will open greater avenues for more Indigenous-led energy projects. As evident in both projects, Indigenous-led energy solutions can help conserve forests and the environment by reducing the consumption of firewood or fossil fuels, while awareness of environmental preservation should be added to such energy projects.

26 Supra note 8

Recommendations

Based on the case studies of the projects mentioned above, below is a non-exhaustive list of recommendations put forth for promoting Indigenous-led energy solutions in Nepal and beyond

1. Government authorities should provide more support to promote Indigenous-led energy solutions through facilitative policies and regulations, subsidies and tax rebates, and targeted support for Indigenous communities and their organizations or support groups.
2. Further innovations and mainstreaming of renewable energy technologies must reduce their costs so that they can be affordable even to impoverished Indigenous communities. Indigenous communities should have easily available information about various technologies available and technical service providers/vendors thereof so that they can determine what suits them best.
3. Projects for Indigenous-led energy solutions should not only provide equipment and installation services but also extensive support for raising awareness and building technical capacities of Indigenous communities to understand the technologies. That is so that they can build, run, repair, and maintain the energy systems themselves as they need. Only then can Indigenous-led energy solutions be truly sustainable, and the communities will be self-reliant.
4. Indigenous women should be targeted in the capacity building of Indigenous communities on renewable energy technologies. This will have multi-faceted impacts not only on women empowerment but also on the strengthening of families and communities and the stewardship of the wider environment.
5. It is important that Indigenous-led energy solutions also compulsorily include socio-economic empowerment or livelihood generation/strengthening components, particularly targeted at women and youth, for the members of the communities to be able to afford the costs of access to energy as well as improve their lives with the use of the energy.
6. Indigenous-led energy solutions should be linked with their impacts on environmental conservation, while awareness-raising on environmental preservation should be added to such energy projects. This will open greater avenues for promoting Indigenous-led energy projects.
7. Traditional/customary leaders and institutions should be involved in the management of projects on Indigenous-led energy solutions, if not in the design of the project itself. This will again ensure (co-)ownership of the Indigenous community on the project while strengthening traditional/customary governance and self-determination of Indigenous Peoples at the same time. Effective participation of Indigenous women and youth should be promoted while involving traditional leaders and institutions.
8. Formation of community-led/based user committees for projects on Indigenous-led energy solutions is another option to ensure (co-)ownership of the beneficiary Indigenous community on the projects. Effective participation of Indigenous women and youth should be promoted in such committees.
9. The co-financing model should be adopted for projects on Indigenous-led energy solutions, whereby the beneficiary community or members thereof also contribute, even though at minimal costs. This will contribute to building (co-)ownership of the community on the project.
10. Government, development actors, support NGOs, and other stakeholders should make greater funding available for Indigenous-led energy solutions. Indigenous-led grantmaking, which can be flexible as per the needs of the beneficiary Indigenous communities, should be promoted for such funding ■

TIMOR-LESTE COVALIMA

Empowering Remote Indigenous Communities in Timor-Leste: Implementing Renewable Energy Solutions

Author: Agustinho Dos Reis De Fatima

1. Brief Background on the Indigenous Communities

Geographically, Timor-Leste is located northwest of Australia and east of Indonesia (Fig.1). The UNDP-SGP's solar panel project is located at **Dato Rua** and **Dato Tolu** village in the **Covalima** municipality (Fig.2). These villages fall under the Fohorem Administrative Post of Covalima Municipality located the southwest of Dili. They both are regarded as remote areas with poor road accessibility and limited access to communication networks. From Dili, it takes nearly nine hours to travel to the villages by car and around eight hours by motorbike (particularly during the rainy season).

Traveling to both these villages during the rainy season is increasingly challenging as travelers need to cross a river and traverse an unpaved, bumpy road.

Fig. 1: Map of Timor-Leste (indicated in yellow circle) in Asia and the Pacific.

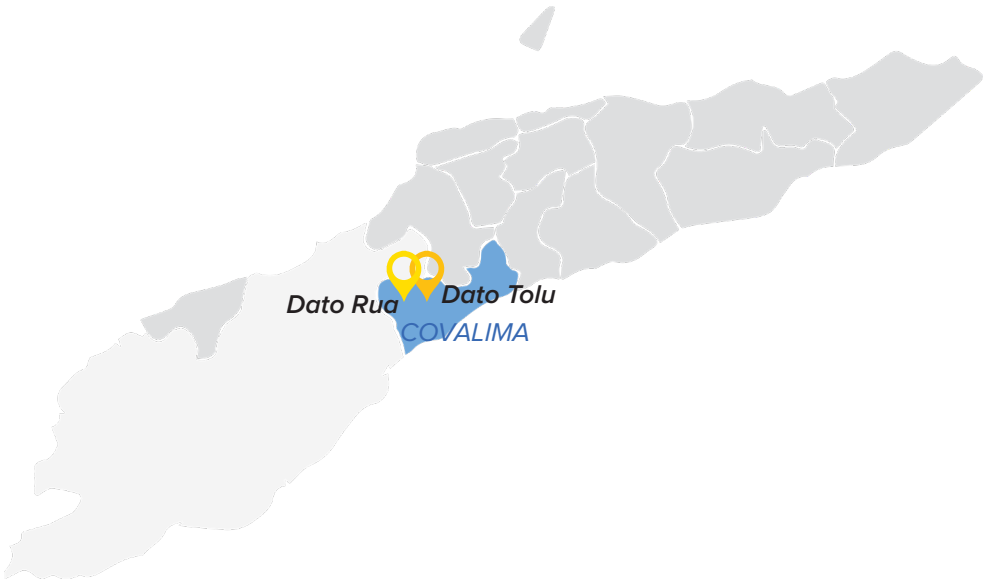


Fig. 2: Location of the project. Dato Rua and Dato Tolu are in the municpality of Covalima.

The Indigenous Communities

The Indigenous Peoples of Timor-Leste's ethnic groups are divided into two key categories of origin, namely Malayo-Polynesian and Papuan origin[1]. The Indigenous groups of Malayo-Polynesian origin are the Mambai, the Tetum, the Tukudede, the Galoli, the Kemak, and the Baikeno. The ethnic groups of Papuan origin are the Bunak, the Fataluku, and the Maksae[2].

Dato Rua village is the Tetum group of Indigenous communities belonging to the Malayo-Polynesian category. These communities speak *Tetun-terik* as a dialect in their day-to-day conversation.

Dato Rua village comprises three *aldeias* (sub-villages), namely Aitos, Halilaran and Fatulidun. There are 43 sacred houses (*Uma-lulik* or *Uma-lisan*) in the village. Of these, 29 *Uma-lulik* received the solar energy project from the UNDP-SGP-funded program implemented by Centro Comunidade Covalima.

Dato Tolu ethnic communities belong to the *Bunak* ethnic group. While they can also speak *Tetun-terik*, *Bunak* is one of their cultural identities and their primary language of communication in daily activities. There are three *aldeias* (in Dato Tolu village namely Fatuk-kabuar kraik, Fatuk-kabuar leten and Natardiik.

Ethnic communities of these two villages have their own sacred house (locally known as *Uma-lisan/Uma-lulik*) headed by a traditional elder (known as *Lia-nain*) who could speak about the traditional or cultural matters (such as traditions inherited by their ancestor) and resolve disputes. These communities of the villages respect the importance of cultural materials and specific sites that are regarded as prohibited (known as *lulik*) in their hamlet. A ritual ceremony is usually carried out when there is a traditional ceremony, such as building a sacred house and launching of development infrastructure in the village.

Socio-economic and environmental conditions

Dato Rua has 294 households with a total population of 1,237, consisting of 646 males and 591 females[3] . Dato Tolu has a total of 42 households with a population of 1,677 individuals consisting of 875 males and 802 females[4]. Most of the communities in the villages rely on agricultural activities as the key source of livelihood. Local agricultural products of these villages include maize, cassavas, and sweet potatoes. Since communities also possess animals, they sometimes sell them to earn money to buy other needs. The communities of this village have access to toilets, clean water, and public elementary schools.

LOCALITY	HOUSEHOLDS	INDIVIDUALS	MALES	FEMALES
DATO RUA	294	1,237	646	591
DATO TOLU	42	1,677	875	802

The existing community clinic and school enable community members to receive treatment when sick and educate their children at the elementary level without needing to walk long distances.

Since communities rely on agriculture, conventional farming practices are still common. This includes practicing slash-and-burn agriculture at the end of the dry season to plant local products such as maize. A number of national and local non-governmental organizations (NGOs) have approached the communities to support conserving the local environment through ecological restoration. This includes the Centru Juventude Covalima supporting the Dato Rua village with the *Tara Bandu* practice (traditional rules and regulations) to avoid slash-and-burn agriculture, prevent deforestation, and promote environmental conservation.

Dato Rua village is a mountainous area surrounded by natural forests and plantations and abundant water sources. Due to its geographic setting, the climate in this area is not as warm as those near the coastal areas such as Suai, the capital of Covalima. Dato Tolu is a hilly village surrounded mostly by forest. It has a natural water spring, and its weather temperature is much cooler than Covalima's capital.

1 Cultural Survival. (2016). Observations on the State of Indigenous Human Rights in Timor-Leste. retrieved from https://www.culturalsurvival.org/sites/default/files/media/uprreporttimor-leste2016.pdf
2 Cultural Survival. (2016). Observations on the State of Indigenous Human Rights in Timor-Leste. retrieved from https://www.culturalsurvival.org/sites/default/files/media/uprreporttimor-leste2016.pdf
3 Data gathered from the village chief during the interview of the project site visit on 26 Nov. 2022
4 Data obtained (during the phone interview) from the village chief.

Access to energy

Despite most households being connected to the national electric grid, some in Dato Rua village still use alternative energy sources, such as candles and traditional kerosene-fueled lanterns. Over the past four decades, most people have lighted their houses (including sacred houses) using local energy sources such as candlenuts and kerosene. Currently, energy sourced from kerosene combined with candles and recently supplied solar panels is being used by communities in the village. It is believed that most *Uma-luliks* who have not yet received solar panels still use kerosene in the evening.

Meanwhile, the Dato Tolu village is not connected to the national electric grid. Most Indigenous communities still use kerosene, candles, and candlenuts as a source of light.

2. Overview of the REP-UNDP SGP Project Implementation

Fig. 3 : Cultural ceremony conducted in Datorua & Dato-tolu village. Photo- CCC Final Report 2022

2.1 Brief Description of the project

With support from UNDP, the local organization Centro Comunidade Covalima (CCC) implemented the renewable energy projects in Timor-Leste entitled ***"Alternative Electrical Energy Innovation"*** in both Dato Rua and Dato Tolu village in Covalima Municipality.

The Alternative Electrical Energy Innovation project was approved by UNDP with agreement number - TLS/SGP/OP6/Y5/CORE/CC/2021/38[5] , and the implementation started in September 2021 through 31 October 2022.

This project is part of a climate change mitigation project based in rural areas under UNDP-SGP. The total budget for this project, as funded under the agreement, was US$29,000.

Process of implementation

Before the solar panel installation, CCC and government officials at the municipality and village levels conducted pre-consultation meetings, surveys, and assessments. The meetings targeted local chiefs and community representatives, aiming to introduce the project activities to community leaders and the target communities. Following the consultation, an assessment was conducted to identify households eligible to receive the solar panels. The assessment was conducted jointly with the chiefs of community hamlets (locally known as *chefe aldeia*) to better determine whether the target households of the Indigenous communities met the basic criteria for receiving solar panels, as formulated by the UNDP-SGP Timor-Leste. The primary criterion was that the household should be categorized as low-income, with a widow as the head of the family.

The technical staff further analyzed the assessment result to ensure that the recipient household of the solar panel fulfilled the criteria established before procuring the solar system equipment and the installation phase. Before purchasing solar system equipment, the implementing NGOs obtained quotations from three shops to ensure they got the best deal within the budget. Following this, the technical staff of NGO Santalum, together with the community and local hamlet authorities, were involved in installing the solar panels in the beneficiary households.

Several youths in the village were trained following the procurement of the equipment. They were provided with basic knowledge on how to assist the solar panel technicians from the implementing NGOs (Santalum & CCC) in installing solar panels in the community houses.

5 Centro Comunidade Covalima. (October 2022). Alternative Electrical Energy Innovation Final Report.

In Covalima Municipality, the Alternative Electrical Energy Innovation project started the installation of the solar panels following a ritual ceremony according to the practice of both Indigenous communities (Fig 3.). The ritual ceremony is performed to ask permission from the spirit of the ancestors and as a gratitude for the implementation of the project. The ceremony was led by representatives from the *Uma-lulik* (a recipient of the solar panels) and attended by the SGP-UNDP National Coordinator, municipality Administrator, communities, local government officials, stakeholders, and staff from the CCC.

2.2 How is it being managed?

The CCC was funded by the UNDP-SGP on access to renewable energy, particularly photovoltaic systems (solar panels). These solar energy projects were managed by the CCC following the submission of its proposal, which went through review and approval under the SGP funding.

In the project implementation, the SGP worked with the National Steering Committee (NSC), which consists of various entities and relevant stakeholders, including the Secretary of State for the Environment.

Throughout the planning and implementation phase, CCC consulted and collaborated with local authorities, communities, UNDP, and local government officials to implement the project.

The CCC was in charge of managing the funding for running the project activities and purchasing photovoltaic system equipment. Under the SGP agreement, the organization received a total of US$29,000 to implement a solar energy project for rural electrification.

As mentioned above, the implementing organizations went through the procurement process by getting quotations from three different solar panel suppliers to get affordable prices per the budget. Following the procurement, CCC's technician delivered the solar energy equipment to the Indigenous communities and installed them at the target houses. Hamlet chief and communities significantly contributed by accompanying the technicians during the installation phase and providing other support, such as local materials (wood or bamboo), as needed.

Solar Light Management Committee (SLMC)

The CCC established the Solar Light Management Committee (SLMC) in the villages of Dato Rua and Dato Tolu. The SLMC is composed of village community members, including the hamlet chief and youth, and consists of six members in total: the chief, secretary, treasurer, and three technicians [6]. The committee would control, manage, and maintain the photovoltaic systems in their communities. The appointed technician would help the people when there are issues with the solar panels in their houses.

The village council (including the village chief and the village secretary) acts as a monitoring team to support the work of the committee in the community. The roles and responsibilities of the SLMC are certified by a written agreement, which is signed by all its members and acknowledged by the village council (see annexed). The agreement also incorporated the roles and responsibilities of the solar light recipients, CCC, and UNDP. The responsibilities of the solar recipients include prohibiting the sale of the solar panel equipment, maintaining the equipment, and making a monthly contribution of US$1.00 to the SLMC for solar light maintenance[7].

6 A document on Agreement of Solar Light Management Committee
7 A document on the Agreement of Solar Light Management Committee

2.3 Project Results: Benefits of the project to the community

Under the Alternative Electrical Energy Innovation project, CCC installed a total of 62 units of solar panels at two villages (Dato Rua and Dato Tolu), each with 31 units. In Dato Rua, 29 units were provided to sacred houses, and two units given to a *chefe aldeia* and secretary of the village. In Dato Tolu, five units of solar panels provided to three *chefe aldeia*, the head of the village, and the village secretary, and 26 were installed at the sacred houses.

Table 1: Solar panel recipients in the two villages.

Solar Panel Beneficiaries	Quantity
Dato Rua	TOTAL: 31
Sacred houses	29
One *chefe aldeia*	1
Village secretary	1
Dato Tolu	TOTAL: 31
Sacred houses	26
Three *chefe aldeias*	3
Head of the village	1
Village secretary	1

These solar panels installed at the *Uma-lulik* of each village will provide light access to the homes of 150 people. Since all communities must belong to a sacred house in the village, it is estimated that more than two hundred people could benefit from the light each year when there are traditional ceremonies and ritual gatherings held in the *Uma-lulik*. Three youths from each village were trained by a technician from CCC to install, maintain, and troubleshoot the solar energy kits should there be issues in the future. Furthermore, CCC conducted a two-day training for nearly 70 people from the two villages. Participants, comprising members of the Solar Light Management Committee (SLMC) and the solar panel recipients, received instruction on basic skills in the maintenance and management of solar panel facilities. Aside from installation, the training topics covered included monitoring solar energy lamps, connecting the main panel board with the solar panel, and checking the solar battery.

The provision of renewable solar power is greatly helping low-income communities reduce greenhouse gasses and support families in doing productive activities more actively in the evening.

The national power grid generates electricity using oil and gas sourced from fossil fuels, making it the second largest greenhouse gas emitter sector after agriculture each year[8]. Putting up solar energy systems in rural communities will help vulnerable families reduce spending on kerosene and candles. Additionally, the use of solar energy will reduce the reliance on fossil fuels in the future, especially when the government expands the national power grid. To date,

8 Country program Democratic Republic of Timor-Leste, Green Climate Fund. (March 2019). Retrieved from https://www.greenclimate.fund/sites/default/files/document/timor-leste-country-programme.pdf

9 https://www.iea.org/reports/sdg7-data-and-projections/access-to-electricity

These solar panels installed at the Uma-lulik of each village will provide light access to the homes of 150 people.

the government's national grid power has yet to cover all villages in the country, particularly those in the remote areas, including the two project sites. Electrification throughout the country is still a challenge for the government. As of 2019, around 19 % of the population has no electricity access[9].

Direct/immediate benefits to the project participants of solar energy

Indigenous communities are pleased with the support of the renewable energy project as it has provided them with light. Even though not all sacred houses in the town have received solar panels, those who have received them are thankful.

With no electricity available in the *Uma-lulik* previously, members of the beneficiary families can now use light throughout the night until morning for a number of activities, including cooking, having meals, studying, and charging phones. Additionally, other community members belong to the *Uma-lulik*, and visitors can benefit from the light when there is a traditional gathering and ritual ceremony held there.

The students used to study with traditional kerosene lamps and candles; however, with the arrival of the solar panels, they could study throughout the evening and do their school homework.

Community members are no longer required to buy candles and kerosene to light up their houses. They could have the option (when they have access to the national grid in the future) to choose the use of electricity either from the power grid or renewable solar light, which is more cost-effective. Additionally, the use of solar energy will reduce the risk of fire accidents caused by short circuits.

Fig. 4: Technician of CCC briefed local technicians in the village on the installation of the solar panel. Photo- CCC Project Report 2022.

Shining Stories from the Beneficiaries

"Grateful to UNDP and CCC for supporting us with the solar panels for our sacred houses in this village. The sacred house serves as a communal cultural center for the families and guests. Light from solar panels is beneficial to sacred houses as they are less dangerous compared to conventional power."

- Village Chief

"We are so thankful to have solar energy because when there is a cultural gathering in the sacred house, members of families belonging to the sacred house could also benefit from it, and we no longer kerosene lamps."

- Gaudencio Perreira, community member

"We now feel happy with the light from solar energy because we no longer use kerosene lamps and candles."

- Jose Felipe, community member

Fig. 5: Felipe Agustinho pictured with the installed solar panel at his Aimuti Uma-lulik. Datorua, 26/11/2022. Photo-Quintino Pires

2.4 Productive end use

With the support from the UNDP SGP, the photovoltaic system has benefitted some of the low-income individuals of the Indigenous community in the rural area of the Covalima Municipality. The light from the solar panel will enable the children to study, do their school assignments, and charge mobile phones and portable lanterns. Also, women can now weave their traditional baskets, prepare meals, and do other household activities in the early morning. Members of the *Uma-lulik* and visitors can enjoy the light during traditional gatherings and ritual ceremonies there.

While there has not been any productive business activity realized from solar energy due to the limited capacity of the system to generate extra power, communities hope that relevant government institutions or NGOs could help them explore their local potential renewable resources such as hydropower and biomass. For instance, Dato Rua has water resources that could be used to generate hydropower, providing an alternative energy source.

3.Challenges, Lessons Learned, and Opportunities

Throughout the project's duration, the CCC encountered numerous issues and concerns. These include some people complaining about selecting only a few households eligible for solar panels. They argued that they should also get solar panels as none of them have access to conventional electricity from the National Power Grid.

Some communities complained about the damage to certain solar panel components (such as collapsed or dysfunctional batteries and broken light bulbs) even if the project has not yet reached one year. When a battery is faulty, it can cause the whole system not to work. This was raised during a field visit after someone complained about their damaged battery. The local technician determined that it could not be repaired and needed to be replaced.

Some recipients modified the solar panels to connect additional devices, such as additional light bulbs and audio speakers, that are beyond the photovoltaic systems' capacity. This led to the collapse of the batteries or the inverter. Some reported their damaged batteries and inverters, but they have yet to be fixed by the local technician. Assistance or repairs could only be provided directly by the implementing NGO's technician. However, the technicians from the

Fig. 6: Focus group discussion in Datorua village. 26/11/2023. Photo-Quintino Pires

NGO no longer assisted them after the completion of the project. One of the recipients said, "This is disappointing for us as we only had the light for less than half-year. Unfortunately, since the implementing NGO completed the project, we cannot request maintenance or a replacement to restore or repair our solar panel."

Aside from the lack of access to conventional electricity, the communities are concerned with the poor road conditions leading to their villages and poor environmental management, such as deforestation.

The COVID-19 pandemic was a great challenge. With the closure of the borders, materials and equipment could not be brought in from abroad to implement the project as scheduled. The solar panel supplier needed to wait until the border restrictions were lifted to get the equipment from abroad. Following the arrival of the materials and solar equipment, the implementing NGOs (Santalum and CCC) needed to observe the COVID-19 protocols in the country. Other challenges for implementing NGOs include access to project sites as the villages are located in rural areas with challenging unpaved roads exacerbated during the rainy season.

Despite the challenges, the implementing NGOs found a few potential actions to address them. They coordinated with community leaders and members, explaining the project and its criteria for target beneficiaries, particularly vulnerable people. The implementing organizations invited the UNDP SGP representative to come over to the village and meet with the communities and local authorities to explain further the selection criteria for the solar panel beneficiaries and the possibility of future grants for solar panels. Consequently, the communities were convinced by the information from the UNDP and local authorities. The photovoltaic systems in Dato Tolu and Dato Rua were expected to be managed and maintained by establishing the SLMC and acknowledging the roles and responsibilities of each player in the agreement. One of the responsibilities of the beneficiaries is to contribute US$1.00 every month to maintain the solar panel systems.

Key lessons learned from the project include the importance of harnessing local support. Community leaders and residents were instrumental in helping the NGOs successfully install solar panels in all target households.

A beneficial approach that can be replicated or learned from this project is the establishment of the Solar Light Management Committee (SLMC) by the CCC. This committee is responsible for managing the solar panel equipment and defining the roles and responsibilities of the beneficiaries, who are expected to make a monthly contribution to cover potential damages to the equipment. While this is a beneficial approach, it is also essential that the rules and regulations be reinforced and implemented as written in the agreement.

Challenges faced by communities

1. Communities complained over the damage to certain solar panel components (such as collapsed batteries and broken light bulbs) within just a year or use.
2. People complained over the criteria of selecting only a few households to receive the solar panels.
3. No advanced level training for local technicians (only basic introduction training)
4. Road accessibility to the villages is so challenging. The communities sought the help of UN entities and international NGOs to raise this issue to the national and sub-national governments.

Challenges faced by CCC

1. The COVID-19 pandemic was a great challenge in the implementation of the project.
2. Road accessibility hampered the project, particularly during the rainy season.
3. Other vulnerable households insisted and requested to receive solar panels also, but due to budget constraints, they could not include them.

Fig. 7: Traditional elder pictured with an installed solar panel in their Uma-lisan Bei-bau, in Datorua village. Photo- Agustinho dos Reis, 26/11/2022

4. Recommendations

To address some of the challenges and issues encountered during the project, the following are recommended for future projects:

- To ensure effective communication and transparency, local implementing NGOs should provide a comprehensive overview of the solar panel project's objectives and intended beneficiaries to the municipal or subdistrict administrator. Subsequently, the local NGO should request the administrator's involvement in the initial consultation with the Indigenous communities being targeted. This consultation aims to clarify and emphasize the solar panel project, including the criteria for selecting beneficiaries, in order to preempt any potential community grievances
- It is highly advisable to prioritize the presence of well-trained local technicians in the project. Implementing NGOs should have a certified technician who can provide combined general training on solar PV technology to both the local technicians and beneficiaries. Additionally, conducting specialized training exclusively for the local technicians on operating, installing, and maintaining solar panel components is crucial. These training sessions should be supported with comprehensive training modules. Therefore, when local NGOs submit their proposals, it is essential for UNDP to ensure that they have the necessary resources, such as certified technicians, to effectively implement the project, with a specific focus on enhancing the skills of local technicians within the communities.
- A contingency plan or risk management plan is needed for implementing NGOs covering a plan to do maintenance following the completion of the project. Quarterly maintenance following the completion of the project would be beneficial to help solar panel recipients during the transition into the self-reliant phase.
- It is of utmost importance to establish a solar panel management group or committee and to ensure that the regulations, roles, and responsibilities of the group are effectively reinforced and put into practice. This ensures efficient and organized management of the solar panels, allowing for optimal utilization and maintenance of the renewable energy system.
- Based on the recommendations of local chiefs and certain Indigenous communities, it is strongly advised that the donor or implementing NGOs continue their support by providing solar panels to the remaining vulnerable households and sacred houses. This continuation of assistance is crucial in meeting the energy needs and preserving the cultural significance of these specific households and sacred spaces ■

TIMOR-LESTE
MANATUTO

Empowering Rural Timor-Leste: Solar Energy for Hatucona

Author: Agustinho Dos Reis De Fatima

1. Brief Background on the Indigenous Communities

Timor-Leste is located towards northwest of Australia and east of Indonesia (Fig. 1). One of the UNDP-SGP solar panel projects was implemented at **Hatucona, Lakumesa** village in the **Manatuto Municipality** (Fig. 2). Hatucona is one of the sub-villages (known as *aldeia*) of the Lakumesa village in the Manatuto Municipality located 74 km to the east of the country's capital-Dili. The hamlet is considered one of the municipality's remote areas, with no electricity, challenging accessibility by road, and limited access to communication networks. From Dili, Hatucona can be accessed through Manatuto Villa and a shortcut road that takes three to four hours by car. Traveling to this hamlet during the rainy season is increasingly challenging as travelers must cross a river and traverse an unpaved, bumpy road.

Hatucona is a hilly town with mountain ranges in the northern part and the Laclo River in the southern part. The town is characterized by its natural vegetation along the mountain ranges, while the flat areas are used for rice fields.

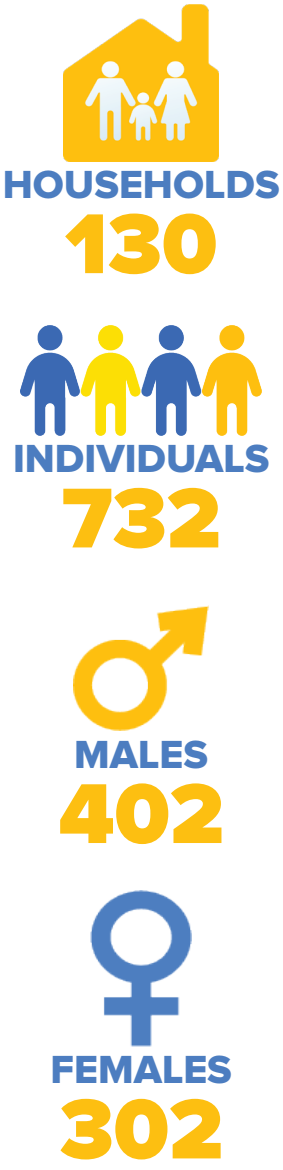
Fig. 1: Map of Timor-Leste (indicated in yellow circle) in Asia and the Pacific.

Fig. 2: Hatucona is situated in the district of Lakumesa in the Manatuto Municipality.

The Indigenous Peoples of Timor-Leste are divided into two key categories of origin, namely Malayo-Polynesian and Papuan origin[1]. The Indigenous groups of Malayo-Polynesian origin are the Mambai, the Tetum, the Tukudede, the Galoli, the Kemak, and the Baikeno. The ethnic groups of Papuan origin are the Bunak, the Fataluku, and the Maksae[2].

The Galoli Indigenous communities of Hatucona village have their own language called *Galolen*. While most communities can speak in Tetun-Dili, they talk to each other in their Galolen language. Hatucona Indigenous communities are the Galoli ethnic group of Malayo-Polynesian origin.

In Hatucona, the Indigenous communities have their sacred house known as *Uma-lisan/Uma-lulik*, which is overseen by a traditional elder called *Lia-nain*. The *Lia-nain* assumes the role of speaking on matters concerning tradition and culture, including the practices inherited from their ancestors, as well as resolving disputes. The Hatucona communities deeply value their cultural artifacts, such as traditional baskets and wood carvings, along with specific sites that hold sacred importance, known as *lulik*, within their hamlet. It is vital for community members to respect these prohibited sites, which may include water springs, specific hills, or mountains. During the harvest season, community members perform rituals in these prohibited sites, such as water springs, to express gratitude for the abundant crop yield obtained from their farming activities.



Socio-economic and environmental conditions

As of 2022, Hatucona has around 130 households with a total population of 732, comprising 302 females and 430 males[3]. Some of these individuals have migrated to neighboring villages more accessible to markets.

These communities rely heavily on agriculture as the main source of livelihood. Local farming products include maize, rice, and cassava. Besides these, communities could also derive income from livestock such as cattle and pigs and selling firewood. Due to limited accessibility by car, the communities walk up to 6 hours to reach markets to sell their products and buy necessary goods.

The existing public infrastructure includes a primary school, a clinic, a chapel, and the Hatucona hamlet center. After the completion of elementary school, students typically walk long distances or move to the city to continue their post-primary education. While communities can access basic medical care in the local clinic, those with complicated illnesses and complex pregnancies must transfer to the municipality hospital nearly 30 kilometers (km) away. Also, while communities have access to sufficient water sources, the limited number of existing water taps (less than five) compel them to queue for hours, even into the late evening, to get water.

Since communities rely on agriculture, conventional farming practices are still common. These include practicing slash-and-burn agriculture at the end of the dry season to plant local products such as maize. Several national and local NGOs have approached the communities to support conserving the local environment through ecological restoration. This includes the Assosiasaun Santalum, which is planning reforestation activities at the end of the project that will involve the local communities.

Access to energy

Despite surveys conducted by the sub-national government official feasibility of connecting to the government electricity grid in Hatucona over the last few years, the area has yet to be connected to the National Power Grid because the government most likely prioritized other sectors and the lack of financial resources.

The alternate energy source in this village usually comes from local products. In the past, they used fruit seeds from local plants such as Java olive trees for lighting,

1 Cultural Survival. (2016). *Observations on the State of Indigenous Human Rights in Timor-Leste*. retrieved from https://www.culturalsurvival.org/sites/default/files/media/uprreporttimor-leste2016.pdf
2 Cultural Survival. (2016). *Observations on the State of Indigenous Human Rights in Timor-Leste*. retrieved from https://www.culturalsurvival.org/sites/default/files/media/uprreporttimor-leste2016.pdf
3 Data gathered from the hamlet chief during the interview of the project site visit on 11th November 2022

cooking, and making fires. To date, a few communities still use seeds of local plants, such as candlenut trees, as a source of energy for lighting in the evening. Currently, communities use this source of energy combined with kerosene, candles, and the recently supplied solar panels.

During their ancestors' time, members of the communities did not have access to fossil-fuel-based lighting. They would use locally sourced materials to generate light in their homes during the evening to enable them to do their activities such as cooking. The only sources of energy for lighting in the sacred house are the seeds of the Java olive tree, the bastard-poon tree, and candlenuts.

2. Overview of the REP-UNDP SGP Project Implementation

With UNDP's support, Assosiasaun Santalum, a local NGO, implemented a renewable energy project entitled "***Sustainable Energy for Rural Communities***" in Hatucona in Manatuto Municipality. The project was granted by UNDP with an agreement number - TLS/SGP/OP6/Y5/CORE/CC/2021/37[4] following its approval of the project proposal. The project commenced on 15 September 2022 and was completed on 15 October 2022.

The GEF SGP UNDP provided funding to Assosiasaun Santalum to implement the project as part of a climate change mitigation project based in rural areas. The total budget for this project, as funded under the agreement, was US$29,000.

2.1 Brief Description of the project

Process of implementation

Before the solar panel installation, CCC and government officials at the municipality and village levels conducted pre-consultation meetings, surveys, and assessments. The meetings targeted local chiefs and community representatives, aiming to introduce the project activities to community leaders and the target communities. Following the consultation, an assessment was conducted to identify households eligible to receive the solar panels. The assessment was conducted jointly with the chiefs of community hamlets to better determine whether the target households of the Indigenous communities met the basic criteria for receiving solar panels, as formulated by the GEF SGP UNDP Timor-Leste.

The technical staff further analyzed the assessment result to ensure that the recipient household of the solar panel fulfilled the criteria established (the first criterion was that the household should be categorized as low-income, with a widow as the head of the family) before procuring the solar system equipment and installation phase Before purchasing solar system equipment, Santalum obtained quotations from three shops to ensure they got the best deal within the budget. Following the equipment purchase, the community and local hamlet authorities were involved in installing the solar panels at the community houses. The technical staff outsourced by Santalum installed a solar system in the houses identified by the local hamlet chief and the implementing NGOs based on the criteria established.

Several youths in the village were trained following the procurement of the equipment. They were provided with basic knowledge on how to assist the solar panel technicians outsourced by Santalum in installing solar panels in the community houses.

2.2 How is it being managed?

The renewable project (photovoltaic systems) was managed by Santalum following the submission of their proposal, which went through review and approval under the SGP funding.

In the project implementation, the SGP worked with the National Steering Committee (NSC), which consists of various entities and relevant stakeholders, including the Secretary of State for the Environment. Throughout the planning and implementation phase, Santalum consulted and collaborated with local authorities, communities, UNDP, and local government officials to implement the project. Santalum was in charge of managing the fund for running the activities related to the project and purchasing photovoltaic system equipment. Under the SGP agreement, the organization received a total of US$29,000 to implement a solar energy project for rural electrification.

As mentioned above, Santalum went through the procurement process by getting at least three quotations from three different solar panel suppliers to get an affordable price in accordance with the budget. Following the procurement, Santalum's technician delivered solar energy equipment to the Indigenous communities and installed them in the target houses. After the solar panels were installed at the target houses, the homeowners were advised to regularly maintain the solar panel components, such as the inverter, battery, and panel, by using soft cloth rags for cleaning.

The *chefe aldeia* (hamlet chief) and communities significantly contributed by accompanying the technicians during the installation phase and providing other support. Although some youths have attended basic technical training on solar panels and the project beneficiaries participated throughout the installation, a solar management committee has not been formed. The local hamlet chief and Santalum strongly urged the recipients to regularly maintain their solar panels and avoid modifying or putting in additional light bulbs and music speakers.

4 Assosiasaun Santalum. (October 2022). *Sustainable Energy for Rural Communities Final Report.*

2.3 Project Results: Benefits of the project to the community

The solar energy project benefits the Indigenous communities of Hatucona. Over a year, Assosiasaun Santalum has installed thirty photovoltaic systems in thirty (30) identified households, community halls, chapels, and low-income communities in the sub-village. This directly benefited 133 individuals, who now have access to lighting in the evening and can charge their mobile phones. As part of the capacity building for communities, Assosiasaun Santalum conducted training for nearly 50 community members in the town, including several youths who were trained on the installation and maintenance of solar panels.

The Solar panel project not only brings significant benefits to the environment but also fosters resilience and sustainability. In addition to harnessing solar energy and conducting capacity-building activities, Santalum took proactive steps by providing seedlings to restore degraded lands in Hatucona village, helping to capture and store carbon dioxide, improve the watershed, and enhance soil stability to prevent erosion and landslides. The distribution of 1,000 seedlings, including albizia (locally *ai samatuku*), evergreen Casuarinas (*ai kakeu*), and other local species, was a result of collaboration with the communities and local chiefs. Furthermore, Santalum extended support to women in the project area, equipping interested women's groups with gardening tools and vegetable seeds, including white mustard, chili, and lettuce, empowering them to cultivate their own yards or gardens.

Of the total 30 units, 8 were installed at sacred houses, 6 at widowed family homes, 1 at the community hall, 1 at the chapel, and 14 at low-income family homes.

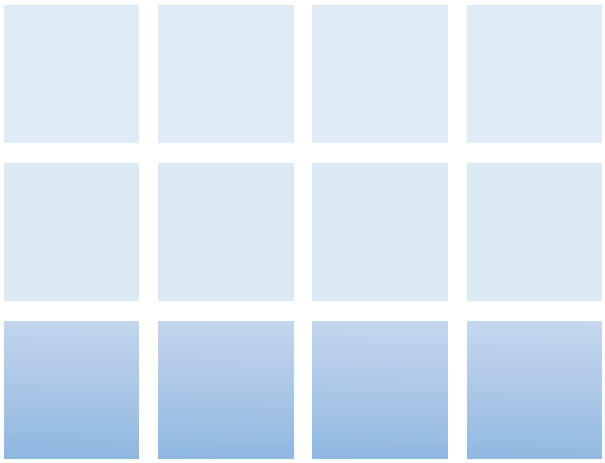


Fig. 3: A family in Hatucona pleased with the light generated from the solar panel. Photo – Assosiasaun Santalum, Final project report 2022.

Fig. 4: Agustinho dos Reis with a community elder of Uma-Lisan Maromak (Maromak sacred house). Photo: Quintino Pires, 11/11/2022.

The provision of renewable solar power is greatly helping low-income communities reduce greenhouse gasses and support families in doing productive activities more actively in the evening. Children can now use the light for studying, and women can use it while weaving baskets.

The national power grid generates electricity using oil and gas sourced from fossil fuels, making it the second largest greenhouse gas emitter sector after agriculture each year[5]. Putting up solar energy systems in rural communities will help vulnerable families reduce spending on kerosene and candles. In the future, decentralized solutions such as solar panel power plants managed by communities could be an alternate energy source for the country.

Additionally, using solar energy will reduce the number of people using fossil energy, reducing greenhouse gas emissions into the atmosphere. To date, the government's national grid power has yet to cover all villages in the country, particularly those in remote areas. This underservice is mostly likely due to the government prioritizing other matters and budget constraints. Electrification throughout the country is still a challenge for the government. The 2018 World Bank report indicates that 15% of the villages have yet to be electrified and are expected to be completed over the next few years[6].

In 2020, a major national power institutional reform was introduced to establish an autonomous public utility and a regulatory body, enhancing electricity services to the public. To provide a more affordable and sustainable energy source in the future, the government has carried out a feasibility study on potential hydropower sources to generate electricity in the country. The study showed a viability of 50 megawatts of hydropower[7].

5 Country program Democratic Republic of Timor-Leste, Green Climate Fund. (March 2019). https://www.greenclimate.fund/sites/default/files/document/timor-leste-country-programme.pdf

6 Democratic Republic of Timor-Leste, (2021). *High level Dialogue on Energy*. https://www.un.org/sites/un2.un.org/files/2021/09/timor_leste_e.pdf

7 Democratic Republic of Timor-Leste, (2021). *High level Dialogue on Energy*. https://www.un.org/sites/un2.un.org/files/2021/09/timor_leste_e.pdf

Shining Stories from the Beneficiaries

“We feel happy to have solar energy now – we have light, we can charge our mobile, and most importantly, our children can use light for studying.”

- Vitor Carceres

"We used to have light sourced from seeds of Java olive and candlenuts. Only a few people can afford to buy candles and kerosene. We are so grateful to have light now – our children can study, and I can use the light to bake and make traditional baskets in the early morning."

- Sabina Bisoi Carceres

"We are thankful to have light from solar energy. We no longer buy kerosene and candles. We can use money to buy other needs. Additionally, there is no more impact of smoke from the kerosene on our health, particularly our children’s."

- Lourenco Malaku

Fig. 7: Interview with village elder Lourenco Malaku (left) in Hatucona-Manatuto, 11/11/2022. Photo - Quintino Pires

Direct/immediate benefits to the project participants of solar energy

Indigenous communities are delighted with the presence of the solar panels project, as the village is not connected to the national grid.

Although photovoltaic units have yet to be provided to all the communities in the town, those who received them are happy as it is their first time using lighting in the evening to brighten up their homes and do activities.

Before solar lights were installed, community members relied on candles, kerosene lamps, and local products like the Java olive tree and candlenut for lighting. With no electricity available in the households previously, members of the beneficiary families can now use light throughout the night until morning for several activities, including cooking, having meals, studying, weaving, and charging phones.

The students used to study in the dark with traditional kerosene lamps and candles or sometimes just in the daytime. Now, they can study throughout the evening and do their school homework. People doing home duties can sew clothes and weave traditional baskets and scarves until late at night and early in the morning. Since the lighting is installed outside the house and kitchen, family members feel more secure throughout the evening because of the reduced threat of trespassing.

"We used to get up in the morning with the house full of smoke from the kerosene-fuelled light. Gratefully, we have clean energy now."

Fig. 5: Santalum staff distributing gardening tools to women. Photo: Assosiasaun Santalum – final project report 2022

Fig. 6: Plots of the vegetable garden . Photo: Assosiasaun Santalum – final project report 2022

The indirect long-term benefits of installing solar panels include saving communities money on candles and kerosene and reducing the time previously spent preparing energy sources from local materials like candlenuts and Java olive trees. The household head will no longer need to budget for candles or kerosene, allowing them to allocate funds to other needs that enhance their well-being.

Communities now have the option to use electricity from the government power grid or renewable solar light, which is more cost-effective. In terms of health benefits, families no longer breathe smoke and volatile gases from kerosene and candlenuts, which can be detrimental to health and the environment.

Additionally, using solar energy will reduce the risk of fire accidents caused by short circuits. One of the solar panel recipients said, "We used to get up in the morning with the house full of smoke from the kerosene-fuelled light. Gratefully, we have clean energy now."

2.4 Productive end-use

With the support from the UNDP DGP, the photovoltaic system has benefitted some of the low-income individuals of the Indigenous communities in the rural areas of the country. The light from the solar panel will enable the children to study, do their school assignments, and charge mobile phones and portable lanterns. Also, women can now weave their traditional baskets, prepare meals, and do other household activities in the early morning. While there has not been any productive business activity realized from solar energy due to the limited capacity of the system to generate extra power, communities hope that relevant government institutions or NGOs could help them explore their local potential renewable resources such as hydropower and biomass. Existing natural resources and bodies of water such as the Laclo River and creeks from the nearest mountain ranges might be potential to explore for energy sources in the town.

3. Challenges, Lessons Learned, and Opportunities

Throughout the life of the project, the community members and Assosiasaun Santalum faced several issues and challenges.

Aldeia Hatucona has yet to access the National Power Grid for electricity. Since only some selected vulnerable households received solar panels, others complained about this as they thought they were eligible too. This perceived inequality has created a division in the community.

Some communities complained about the damage to certain solar panel components (such as collapsed or dysfunctional batteries and broken light bulbs) even if the project has not yet reached one year. A faulty battery can cause the whole system not to work, thus causing darkness in homes.

Some communities blamed the hamlet chief and Santalum for not putting strict rules and regulations in place for the solar panel beneficiaries. Some recipients modified the solar panels to connect additional devices, such as additional light bulbs and audio speakers, that are beyond the photovoltaic systems' capacity. This led to the collapse of the batteries or the inverter. Furthermore, with no local technician available, it would pose a challenge for the communities when their solar panel component needs maintenance. During the initial consultation conducted by Santalum, they were informed that local companies complained to the village chief that Santalum should not implement the solar panel project; instead, a local private sector should have done it. The director of Assosiasaun Santalum approached those companies and explained to them about the scale of the project and its importance for the vulnerable communities.

Fig. 8: : Focus group discussion in Hatucona-Manatuto, 11/11/2022. Photo-Agustinho dos Reis de F.

Aside from the lack of access to conventional electricity in Hatucona, communities are concerned with road access, clean water, and poor environmental management, such as deforestation. Communities get water from the existing water taps and springs, and they usually boil water using wood before drinking.

The COVID-19 pandemic was a great challenge. With the closure of the borders, materials and equipment could not be brought in from abroad to implement the project as scheduled. The solar panel suppliers (canvassed from three suppliers, namely Global Electronics, Royal Electronics, and Electronic Sales) needed to wait until the COVID-19 restriction at the border were lifted to get equipment from abroad. Following the arrival of the materials and solar equipment, Santalum needed to follow COVID-19 protocols in the country. Other challenges for the Santalum includes access to the project sites as those villages are located in rural areas with unpaved roads, which becomes more challenging during the rainy season.

Despite the challenges, Santalum found a few potential actions to address them. They coordinated with community leaders and members, explaining the project and its criteria for target beneficiaries, particularly vulnerable people. Santalum conducted private meetings with the directors of local private companies to explain the scale of the project and its criteria for selecting the community members to benefit from the project.

Key lessons learned from the project include the importance of harnessing local support. Community leaders and residents were instrumental in helping the NGOs successfully install solar panels in all target households. The project was a great experience for Santalum, marking their first solar panel project implementation and expanding their expertise beyond forest management and the agriculture sector.

Santalum conducted the initial project consultation using the bottom-up approach. They consulted with the community and village leaders about the project before consulting with the sub-national government official. Another lesson learned for Santalum was that some households outside the criteria, although still vulnerable, received panels. Santalum acknowledged this oversight and committed to strictly adhering to the selection criteria in future projects.

Challenges faced by communities

1. Some community members felt discriminated against because the solar panels were provided to only a select few, despite their similarly vulnerable economic conditions.
2. There was a complaint over receiving damaged solar panel components, such as a broken light bulb.
3. No advanced training for local technicians (only basic introduction training)
4. No rules and regulations for solar panel beneficiaries
5. Private sector companies asked to manage the project, not the local NGOs.
6. Communities raised concerns about the accessibility to their village, clean water, and deforestation due to mainly shifting cultivation and wood for selling.

Challenges faced by Assosiasaun Santalum

1. The COVID-19 pandemic was a great challenge in the implementation of the project.
2. Certain households becoming recipients of solar panels even though not meeting the criteria
3. Road accessibility to the village is a challenge, especially during the rainy season.

4. Recommendations

Necessary actions to address some of the issues and challenges for future solar panel projects:

The solar energy is a great benefit to Indigenous communities in the rural areas. It would ensure that low-income individuals will have equitable and sustainable access to energy for basic services, which would help enhance their living.

To address some of the challenges and issues encountered during the project, the following are recommended for future projects:

- Strongly recommend having trained local technicians. Implementing NGOs should have a certified technician conduct general training on solar PV technology for the community, especially the beneficiaries. It is also necessary to conduct special training for local technicians on how to operate, install, and do maintenance to solar panel components – provided with training modules to local technicians. This means that during the proposal submission by local NGOs, UNDP should ensure that local NGOs have resources (certified technicians) to help implement the project, particularly in capacitating the local technicians in the communities.

- Local implementing NGOs should brief the municipal or subdistrict administrator on the aim of the solar panel project and its target beneficiaries. Following the briefing, the administrator should be requested by the local NGO to participate in the initial consultation with the target Indigenous communities to clarify and highlight the solar panel project, particularly the criteria to be beneficiaries, to avoid complaints from the communities.

- A contingency plan or risk management plan is needed for implementing NGOs covering a plan to do maintenance following the completion of the project. Quarterly maintenance following the completion of the project would be beneficial to help solar panel recipients during the transition into the self-reliant phase.

- The communities and local chief recommended to donors or implementing NGOs to continue supporting the remaining vulnerable households and sacred houses with solar panels.

- Establishing a solar panel management group/committee is imperative, and regulations, roles, and responsibilities of the group need to be reinforced and put into practice■

KEY ACHIEVEMENTS

CAMBODIA

The implementation of the Clean Water System powered by solar energy in Kbal Romeas and Mondulkiri in Cambodia has not only provided access to clean water and improved health but also empowered the communities, particularly women and youth, while fostering economic diversification through sustainable energy use and ecotourism.

CAMEROON

Solar energy projects in Cameroon have replaced firewood with solar lights, reducing emissions and promoting education while fostering economic benefits such as cost savings and community ownership, demonstrating their holistic impact on the Indigenous communities.

DEMOCRATIC REPUBLIC OF CONGO

Through the provision of renewable energy access, the initiative not only improved the living standards of Indigenous Pygmy peoples but also played a pivotal role in forest conservation, climate change mitigation, and enhancing community safety.

EL SALVADOR

The project successfully addressed the critical need for electricity in isolated Indigenous communities. By installing solar panels and creating a bidirectional energy system, the initiative not only provided lighting but also economic opportunities, improved health, and strengthened community organizations. It serves as a model for harnessing solar energy to reduce inequality, enhance resilience, and empower Indigenous communities in the country.

HONDURAS

The Mini Community Hydroelectric Project has not only enhanced environmental sustainability and energy autonomy but also empowered the local Lenca community, resulting in increased awareness of energy conservation, improved social cohesion, and economic opportunities.

NEPAL

In Bardiya, renewable energy technologies and improved cooking stoves boosted agricultural productivity, empowered women, and promoted community cooperation through traditional leaders. In Humla, the electrification initiative, led by local Indigenous women trained as "solar mamas," improved education, health, and gender equality while advancing environmental conservation and disaster readiness, highlighting renewable energy's transformative impact in remote Indigenous communities.

TIMOR-LESTE

By providing solar panels and renewable energy solutions in Covalima and Manatuto municipalities, the project has not only brought light to Indigenous Peoples in the areas, but also empowered them with improved access to education, reduced environmental impact, and enhanced overall well-being, demonstrating the transformative potential of sustainable energy initiatives in underserved Indigenous communities.

OVERALL IMPACTS

1. **Improved Access to Essential Services**
   These initiatives have significantly improved access to clean water, electricity, and lighting in Indigenous communities, enhancing the overall quality of life.

2. **Health and Well-Being**
   Access to clean water, improved cooking stoves, and electricity have led to better health outcomes and well-being among community members.

3. **Empowerment of Marginalized Groups**
   Particularly, women and youth have been empowered through these initiatives, gaining economic opportunities and increased social participation.

4. **Environmental Benefits**
   Sustainable energy projects have played a pivotal role in emissions reduction, forest conservation, and climate change mitigation, contributing to the protection of natural resources.

5. **Economic Diversification**
   These initiatives have fostered economic diversification through sustainable energy use, ecotourism, and other income-generating activities.

6. **Education Promotion**
   Increased access to electricity has promoted education by providing lighting for studying, enhancing educational opportunities for children and adults alike.

7. **Community Cohesion and Cooperation**
   Social cohesion has improved as communities work together to manage and benefit from sustainable energy resources.

8. **Gender Equality and Women's Empowerment**
   Initiatives like the training of "solar mamas" have advanced gender equality by empowering women in traditionally marginalized roles.

9. **Disaster Readiness**
   In some cases, these initiatives have improved disaster readiness by providing reliable energy sources and community organization.

10. **Cost Savings and Ownership**
    Indigenous communities have experienced cost savings and a sense of ownership in managing their energy resources.

Collectively, these sustainable energy projects have had a transformative impact on Indigenous communities, addressing multiple socio-economic, environmental, and empowerment-related challenges.

CHALLENGES

1. **Capacity Building**
   One of the major challenges faced in advancing Indigenous-led energy systems is the need for continuous technical capacity building within Indigenous communities. This training is essential to ensure that community members can effectively operate and maintain renewable energy systems.

2. **Maintenance Challenges**
   The lack of local technicians and high maintenance costs can pose significant challenges to the sustainability of renewable energy projects in Indigenous areas. Without proper maintenance, these systems may fail or become inefficient over time.

3. **Lack of Guidelines**
   Inadequate guidelines for the use and maintenance of solar panels and other renewable energy technologies can lead to misuse and damage. Clear and accessible guidelines are necessary to ensure the longevity and effectiveness of these systems.

4. **Equipment Availability**
   In some cases, it is necessary to import equipment for renewable energy projects due to the unavailability of technology in the region. This can increase costs and logistical challenges.

5. **Limited Capacity**
   Some renewable energy systems implemented in Indigenous areas may have limited capacity, which can hinder efforts to preserve food and forest products. Insufficient energy capacity can limit economic and social benefits.

6. **Sustainability**
   Ensuring the sustainability of renewable energy projects remains a challenge, especially in areas with limited capacity for payment and maintenance. Long-term funding and community involvement are essential for project continuity.

7. **Lessons Learned**
   Indigenous-led energy projects have emphasized the importance of several factors, including Prior Informed Consent, community ownership, capacity building, exchange visits, and exploring hybrid energy sources, as crucial for success.

WAYS FORWARD

1. **Promoting Self-Determined Development**
   Indigenous-led energy projects should serve as models for other communities, promoting self-reliance and self-determined development. These projects can demonstrate the potential for sustainable energy solutions within indigenous contexts.

2. **Government Support**
   Governments should play an active role in supporting Indigenous-led energy solutions. This support can take the form of policies, subsidies, and targeted assistance to facilitate the implementation and expansion of renewable energy projects in Indigenous areas.

3. **Cost Reduction**
   Innovations and cost-reduction measures in renewable energy technologies are needed to make them more affordable and accessible to Indigenous communities. Reducing the initial cost of equipment and installation can increase adoption rates.

4. **Comprehensive Support**
   Renewable energy projects should include raising awareness and developing technical skills for Indigenous communities. This holistic approach can empower community members to take ownership of these projects effectively.

5. **Targeting Indigenous Women**
   Capacity building for Indigenous women in renewable energy not only enhances their role in project implementation but also yields multiple benefits for the community, including improved gender equality and economic opportunities.

6. **Environmental Conservation**
   Linking energy projects with environmental conservation efforts can garner broader support. Highlighting the positive impact of renewable energy on the preservation of Indigenous lands and resources can strengthen partnerships.

7. **Involvement of Traditional Leaders**
   Traditional leaders and institutions should be actively involved in the design and implementation of renewable energy projects. Their guidance and support can enhance the cultural relevance and acceptance of these initiatives.

CONCLUSION

Addressing the challenges and pursuing these forward-looking strategies is crucial to advancing Indigenous-led energy systems while respecting Indigenous rights and promoting sustainable development. The Right Energy Partnership, in collaboration with the UNDP GEF Small Grants Programmes, exemplifies the commitment to empower Indigenous peoples and promote positive change through renewable energy access.

Right Energy Partnership with Indigenous Peoples
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Facebook: Right Energy Partnership with Indigenous Peoples - REP
X: @RepInitiative
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