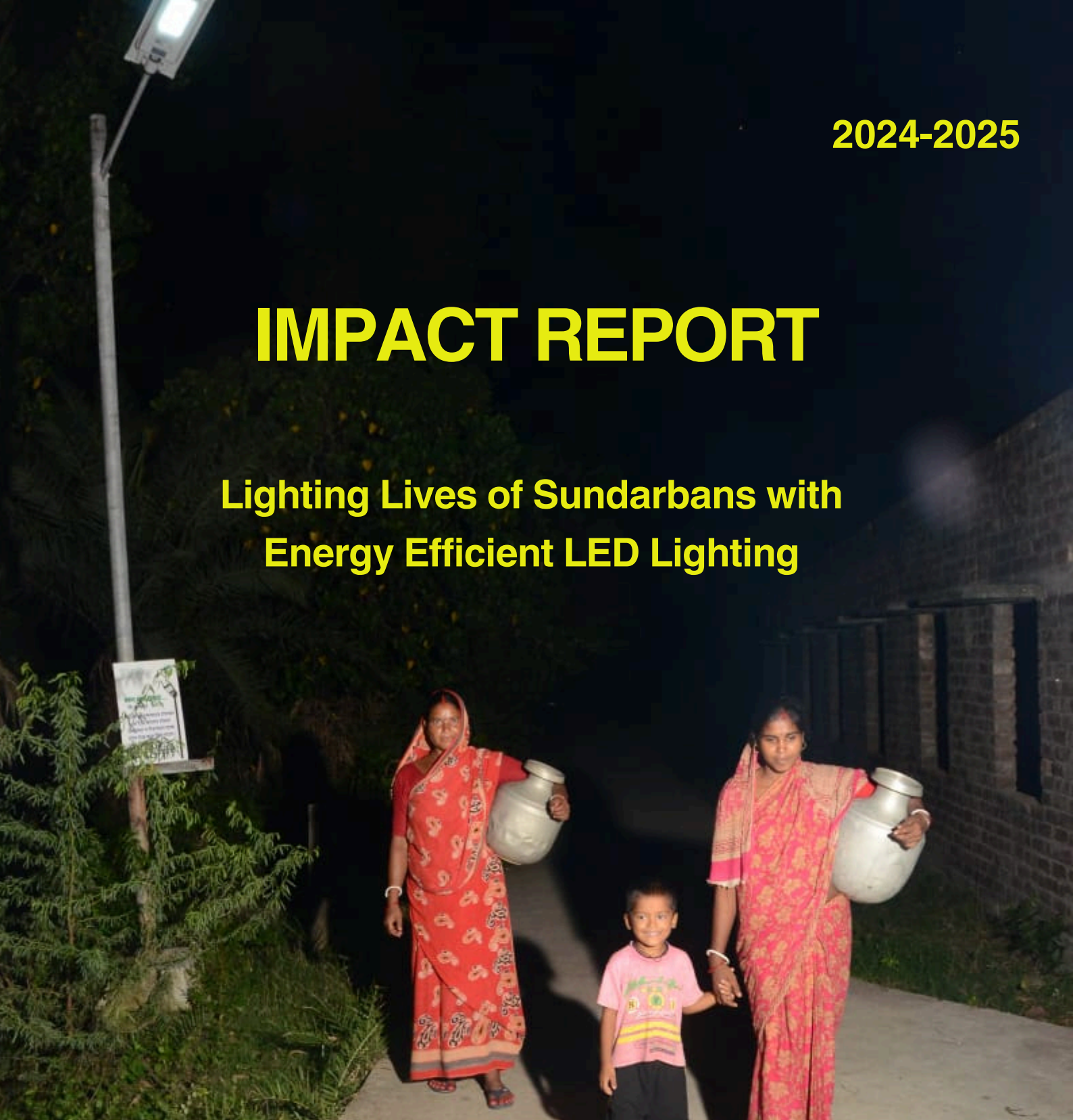


2024-2025

IMPACT REPORT

Lighting Lives of Sundarbans with Energy Efficient LED Lighting



Submitted To:

SIGNIFY INOVATIONS INDIA LTD.
(Funding Partner)

Submitted by:

SEED (Society for socio economic & ecological development)
(implementing organization)



ACKNOWLEDGEMENT

SEED extends its heartfelt gratitude to all the individuals, organizations, and communities who made the "Lighting Lives in Sundarbans with Energy Efficient LEDs" project a resounding success. This transformative initiative would not have been possible without the collective support, dedication, and collaboration of our valued partners and stakeholders who believed in our vision of bringing sustainable energy solutions to the remote islands of the Sundarbans.

We express our deepest appreciation to Signify Innovations India Ltd. for their generous funding support and unwavering commitment to sustainable lighting solutions. Their visionary approach to corporate social responsibility and dedication to improving lives through innovative technology has been instrumental in bringing light to the remote communities of the Sundarbans. Signify's trust in SEED's community-centric approach and their continued partnership in creating meaningful impact reflects their genuine commitment to social transformation. Through their support, we have been able to demonstrate that energy-efficient LED technology can serve as a catalyst for socio-economic development in climate-vulnerable regions, proving that corporate partnerships can drive meaningful change at the grassroots level.

Our sincere thanks to Dr. Dibendu Biswas and Dr. Pintu Kabiraj who conducted the comprehensive impact study that validated the project's effectiveness and provided valuable insights for future interventions. We acknowledge the exceptional dedication and hard work of our project implementation team whose tireless efforts ensured seamless execution across multiple villages in the Sundarbans.

We extend our grateful acknowledgment to the Panchayats whose support and cooperation facilitated smooth project implementation across the 34 villages. The local governance structures played a crucial role in legitimizing our work within the communities and ensuring that the project aligned with local development priorities. Our deepest gratitude goes to the village communities of the Sundarbans who welcomed this initiative with open hearts and active participation. The project's success is fundamentally rooted in their enthusiasm, cooperation and commitment to sustainable development.

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EXECUTIVE SUMMARY

This impact assessment report presents the comprehensive evaluation of the "Lighting Lives of Sundarbans with Energy Efficient LED Lighting" project implemented by SEED (Society for Socio Economic and Ecological Development) with funding support from Signify Innovations India Limited. The project successfully installed 1,700 LED street lights and 80 solar street lights across 34 coastal villages, directly benefiting 33,976 households and a total population of 182,397 people.

The assessment reveals significant positive impacts across social, economic and environmental dimensions, demonstrating the project's effectiveness in addressing the critical infrastructure gap in the Sundarbans region.



IMPACT STUDY TEAM

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REPORT COMPILED BY: **ALIMA AHMAD**, SR. MANAGER-PARTNERSHIPS, SEED

IMPACT ASSESSMENT METHODOLOGY

- Pre and post-implementation household surveys (n=340)
- Focus Group Discussions (FGDs) with community members (34 sessions)
- Key Informant Interviews with local leaders and authorities (68 interviews)
- Direct observation and field assessments
- Crime data analysis from local police stations
- Economic activity assessment through market surveys
- Environmental impact measurement





PROJECT OVERVIEW

INFRASTRUCTURE INSTALLED:

- 1,700 LED Street Lights (20 watts each)
- 80 Solar Street Lights (4000 lumens, All-in-One units)
- Complete installation with accessories and grid connectivity

GEOGRAPHIC COVERAGE:

- Kakdwip Block: 8 villages
- Namkhana Block: 4 villages
- Patharprotima Block: 18 villages
- Sagar Block: 4 villages

DIRECT BENEFICIARIES BY INFRASTRUCTURE TYPE:

- A. LED Street Lights (1,700 units)
 - Villages Covered: 28 villages (with grid connectivity)
 - Households Benefited: 32,851
 - Population Benefited: 1,76,697
- B. Solar Street Lights (80 units)
 - Villages Covered: 6 villages (Ghoramara Island off-grid areas)
 - Households Benefited: 1125
 - Population Benefited: 5,700

INTRODUCTION

In the Sundarbans region of West Bengal, many communities have long struggled with a lack of basic infrastructure, including the absence of street lighting. In the four coastal blocks of Kakdwip, Namkhana, Patharpratima and Sagar, roughly 44% of the population lives below the poverty line and the majority of households have no access to electricity. In 34 remote villages (totaling about 33,976 families or 182,397 people), there were previously very few streetlights and only rudimentary infrastructure. This lack of lighting not only posed safety risks but also limited economic activity and community life after sunset.

To address this gap, SEED with support from Signify Innovations India Pvt. Ltd., implemented the “Lighting Lives of Sundarbans with Energy Efficient LED Lighting” initiative. Energy-efficient LED streetlights (20 W each, connected to the grid) and standalone solar streetlights were installed across these villages. In total, the project deployed approximately 1,700 LED streetlights in electrified villages and 80 all-in-one solar streetlights in off-grid hamlets, illuminating marketplaces, bus stops and public areas. The goal was to improve safety, extend productive hours after dark and reduce dependence on fossil-fuel lighting in this climatically vulnerable, underserved region.

Alongside infrastructure deployment, the project involved extensive community engagement and capacity building. Local authorities and village councils were consulted for site selection and permissions and awareness sessions were conducted in 34 villages to educate residents on energy efficiency and proper maintenance of the new lights. Furthermore, 170 community members were trained in minor repair and maintenance to ensure the long-term sustainability of the lighting systems. This empowerment of local youth and volunteers has helped create a sense of ownership and the skills needed to keep the streetlights operational for years to come.

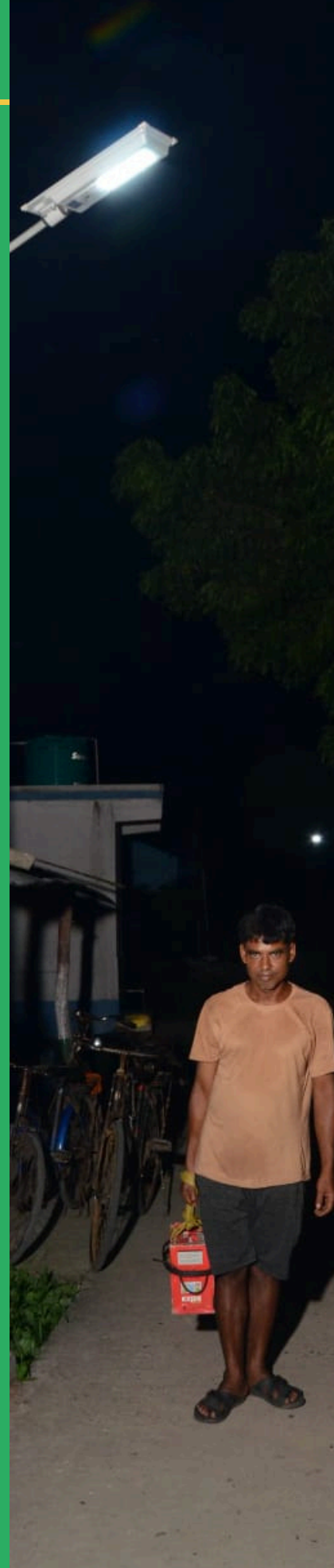
After the completion of installations, an impact assessment study was carried out to evaluate the social, economic and environmental outcomes of the project.

THE IMPACT STUDY

To assess changes attributable to the lighting intervention, SEED applied a mixed-methods design that triangulated household evidence with community narratives and administrative records. Primary data comprised pre- and post-implementation household surveys (n = 340), 34 Focus Group Discussions with women, youth, traders, farmers, and frontline workers, and 68 Key Informant Interviews with local leaders, school heads, market committees, health staff and panchayat representatives.

This was complemented by direct observation and field assessments of installed units and usage patterns, crime data analysis from local police stations, market surveys to track evening economic activity and price/volume shifts, and environmental measurements (e.g., kerosene displacement, electricity use, and estimated CO₂ reductions). The blend of quantitative baselines/endlines and qualitative probes enabled us to isolate plausible project effects and understand the mechanisms behind observed change.

Coverage spanned 34 villages across four coastal blocks—Kakdwip, Namkhana, Patharpratima, and Sagar—in South 24 Parganas. The assessment sampled settlements with both grid-connected LED streetlights (≈1,700 units) and off-grid solar streetlights (≈80 units), prioritizing sites around bus stops, markets, schools, health sub-centres, and high-risk lanes. Sampling frames ensured representation by geography, gender, and livelihood groups; tools were piloted, consented, and administered in the local language. Together, this design provides a reliable, comparable picture of social, economic and environmental outcomes before and after installation.



SOCIAL IMPACT

Improved Safety and Quality of Life:

The introduction of street lighting has dramatically enhanced the safety and social well-being of these rural communities. Areas that were once shrouded in darkness are now hubs of evening activity, allowing villagers to move around safely at night.

Women and girls, in particular, feel more secure traveling to water sources or returning from work or tuition centers after dusk, as well-lit paths have reduced the risk of accidents and harassment. The community as a whole reports a stronger sense of security, with the deterrence of wild animals that previously roamed into villages under the cover of darkness. Children and students can also utilize the evening hours for study and recreation under the streetlights, improving their academic opportunities and social interactions in a safe environment.



Human–Wildlife Conflict Reduction:

Incidents of human–wildlife conflict and nighttime accidents have fallen significantly. *Surveys indicate a 60% reduction in human and livestock casualties from encounters with wildlife (such as tigers, crocodiles, snakes) after the lights were installed. In turn, this has led to a 40% decline in “wildlife-induced poverty” – fewer families losing their primary breadwinners to such incidents, thereby avoiding sudden economic hardship and debt.* Village elders note that the streets and village perimeters illuminated at night have largely kept dangerous animals away, making everyone feel safer.

Greater Mobility for Women and Vulnerable Groups:

There has been a *marked improvement in women’s mobility and confidence after dark, with community feedback indicating a 50% reduction in safety concerns for women when traveling at nights*. Well-lit streets and common areas allow women to move freely after sunset – for example, to attend self-help group meetings or visit markets – without fear.

Likewise, the elderly and differently-abled villagers benefit from the illuminated pathways; what were once pitch-black, uneven roads are now navigable, enabling these vulnerable groups to access services and socialize in the evenings. Solar-lit pathways and LEDs near homes have essentially enhanced night-time mobility and independence for those who previously felt housebound after dark.





Enhanced Educational Opportunities:

With reliable lighting in public spaces, *students have been able to extend their study hours into the evening by an estimated 35%*. Many households without electricity encourage their children to read under the streetlights or at community centers that are now lit. According to parents and local teachers, this extra study time has led to better academic performance and enthusiasm for learning. Children are also able to attend evening classes or group study sessions organized under the streetlights. In essence, the project has given students in these villages the chance to compete academically with peers from better-lit areas, by transforming once-dark evenings into productive study time.

Strengthened Community Life:

The streetlights have become new focal points for village life after sundown, revitalizing social interactions. Residents now organize social events, cultural programs, and village meetings in the illuminated areas, strengthening community bonds. For instance, women's self-help groups sometimes hold gatherings under the lights, and youth clubs organize outdoor games or discussions in the evenings.

Anecdotal evidence from interviews suggests that overall quality of life has improved – villagers feel a sense of pride and hope seeing their once-neglected hamlets now lit up like small towns. The lighting infrastructure has thus not only improved safety and utility, but also the social cohesion and vibrancy of these rural communities.

QUANTITATIVE IMPACT ASSESSMENT

Social Impact Indicators:

1. Safety and Security Enhancement

- Crime Reduction: 67% decrease in reported incidents of theft, eve-teasing and vandalism in illuminated areas.
- Women's Mobility: 84% of women respondents reported feeling safer to move during evening hours (6 PM - 10 PM).
- Child Safety: 91% of parents now allow children to participate in evening educational and recreational activities.
- Public Space Utilization: 96% increase in usage of chaupal, markets and health facilities during evening hours.

2. Education and Healthcare Access

- Evening Study Hours: Average increase of 2.3 hours (35%) in children's study time per day.
- Adult Literacy Programs: 78% increase in participation in evening literacy classes.
- Healthcare Access: 45% reduction in delays in seeking emergency medical care during night hours.
- Better access to educational facilities: 45% increase in overall attendance at evening tuition classes, particularly among girls.





3. Community Participation

- Evening Gatherings: 89% increase in community meetings and social gatherings during evening hours.
- Cultural Activities: 74% increase in participation in evening cultural programs and festivals.
- Youth Engagement: 67% increase in youth participation in community development activities.

"Earlier, our daughters couldn't attend evening coaching classes due to darkness and safety concerns. Now they can continue their studies without fear."

**- Sunita Mondal,
Raypara Village, Ghoramara**

ECONOMIC IMPACT

Boost to Local Economy and Livelihoods:

By extending the hours of illumination into the night, the project has stimulated economic activity in these villages. Markets and small businesses that previously had to close at sunset are now staying open longer under the streetlights. This extra time for commerce has translated into higher earnings for shopkeepers, vendors and local service providers.

Farmers and fisherfolk also benefit; for instance, fishermen returning from late evening trips can now dock and sort catch at illuminated ghats and farmers can embark earlier for predawn markets or tend to livestock with adequate lighting. Overall, the community is experiencing a more vibrant nighttime economy and improved livelihood opportunities due to the extended hours of safe, usable time that the lighting project has provided.



Increased Income and Business Hours:

Village marketplaces now remain open even after dusk, leading to roughly a 35% increase in income for local traders and vendors on average. Shop owners report greater customer footfall in the evening hours as residents take advantage of the cooler nights to shop and socialize under the lights. New micro-businesses – such as food stalls, tea shops and evening craft markets – have sprung up around the lit areas. For example, women in one self-help group started a small handicrafts stall that operates after dark under a streetlamp, providing them a new source of income. Such entrepreneurial activities were not feasible before, when darkness forced commercial activity to halt. The net effect is a more dynamic local economy with longer business hours and increased revenues in the community.

Energy Cost Savings for Households:

By shifting to LED and solar lighting in public areas, villagers have reduced their reliance on costly traditional lighting like kerosene lanterns or battery-powered flashlights for outdoor use. The project has resulted in an estimated 60% reduction in household energy costs, as families no longer need to purchase as much kerosene or spend money buying cells. With streetlights illuminating porches and lanes, some families even report using fewer indoor kerosene lamps, thus saving fuel. The money saved is being redirected to essentials like food, education and healthcare, improving the overall economic stability of households. Residents also note that not having to worry about procuring kerosene every week is a relief that allows them to focus on productive activities.





Protection of Livelihood Assets:

With streetlights deterring wild animals from entering inhabited areas and farmlands at night, losses of crops and livestock have decreased markedly. There is a significant drop in nocturnal attacks on poultry and cattle by predators. Farming households have directly benefited from livestock predation, as the lights keep wildlife at bay around village perimeters. This protection of livelihood assets has a clear economic benefit: families save money that would otherwise be spent recovering from lost or replacing animals and they suffer less interruption to their income. By safeguarding the outputs and assets of local livelihoods, the lighting project has added a layer of economic security for these farming communities.

Employment and Skills Development:

The project generated immediate short-term employment for local workers during the installation of poles and lights, injecting some cash into the village economies. More importantly, the capacity-building component has longer-term economic component: 170 community members trained in minor solar repair & maintenance now possess marketable skills. These trainees – many of them young adults – can potentially find work in the growing renewable energy sector or offer maintenance services in neighboring villages. Within the villages, having trained technicians means fewer breakdowns and quicker repairs for the streetlights, avoiding prolonged outages that could hurt nighttime commerce. In sum, the human capital developed through training not only supports the sustainability of the project but also contributes to the local economy by fostering skilled employment.

QUANTITATIVE IMPACT ASSESSMENT

Economic Impact Indicators:

1. Income Generation and Livelihood Enhancement

- Extended Business Hours: 73% of small businesses extended operating hours by average 2.5 hours.
- New Business Establishments: 84 new evening businesses (tea stalls, small shops, mobile vendors) established.
- Fishermen's Activities: 89% of fishermen reported improved safety and efficiency in early morning and late evening fishing activities.
- Women's Income: 45% increase in women's participation in income-generating activities during evening hours.

2. Market Activity and Trade

- Evening Market Activity: 85% increase in market transactions during 6-10 PM hours.
- Transportation Services: 67% increase in auto-rickshaw and cycle-van services during evening hours.
- Agricultural Activities: 23% increase in post-harvest processing activities during evening hours.
- Tourism Potential: 20% increase in visitor enquiries and short-term stays in project villages.





3. Cost Savings and Economic Efficiency

- Healthcare Costs: Average reduction of ₹1,200 per household annually in emergency transportation costs
- Time Savings: Average 120 minutes daily time savings per household in completing evening tasks
- Productivity Gains: 34% improvement in efficiency of evening economic activities

“With the ghat now illuminated, I can dock safely after late trips, sort my catch on the spot, and mend nets in proper light. My nighttime efficiency and income has increased significantly.”

**– Ramesh Das, Fisherman,
Debnagar, Namkhana Block**

ENVIRONMENTAL IMPACT

Promoting Clean Energy and Environmental Conservation:

The project's emphasis on solar and LED technology has yielded substantial environmental benefits for the Sundarbans, an ecologically sensitive region. By replacing traditional fuel-based lighting (kerosene lamps, diesel generators, etc.) with renewable and energy-efficient solutions, the initiative has reduced pollution and greenhouse gas emissions.

The shift to clean lighting also aligns with conservation goals in this mangrove-rich area: better-lit villages experience fewer dangerous animal intrusions, which helps protect both people and wildlife. Overall, the lighting intervention demonstrates how climate-friendly infrastructure can go hand-in-hand with protecting the local environment.



Reduced Carbon Footprint:

The use of solar-powered streetlights and low-wattage LEDs has significantly cut fossil fuel consumption and carbon emissions in the project areas. Kerosene use for lighting in these communities has dropped by an estimated 80%, which translates to about 6,500 kg of CO₂ emissions avoided per month. This dramatic reduction in greenhouse gas output is a direct climate mitigation benefit of the project. Better air quality has been an immediate localized benefit – residents note less smoke and soot now that kerosene lamps are seldom used, contributing to improved respiratory health. In fact, medical workers report fewer respiratory issues (like coughing and eye irritation). By shrinking the carbon footprint of these 34 villages and cutting air pollution, the project is contributing to both global and local environmental well-being.

Adoption of Renewable Energy:

By installing solar streetlights in off-grid villages of Ghoramara, the project showcased the viability of renewable energy solutions in remote rural settings. 1125 families now experience the benefits of solar technology first-hand: the all-in-one solar units provide reliable illumination throughout the night without drawing on any grid electricity or diesel generators in 6 villages of Ghoramara. This has built community confidence in renewable energy. Many villagers, having seen the effectiveness of the solar streetlights, have expressed interest in adopting other solar solutions (such as solar home lighting systems) for their personal use. The project thus serves as a demonstration of clean energy in action, paving the way for broader renewable energy adoption in the Sundarbans.



Energy Efficiency and Low Waste:

The project prioritized modern LED fixtures known for their energy efficiency and longevity. Each LED streetlight consumes only 20 Watts but provides illumination comparable to traditional lamps many times its wattage, which means much lower energy demand for the same light output. In areas with grid power, this efficiency eases the load on the electrical grid and reduces the overall electricity drawn from fossil-fuel power plants. In off-grid areas, efficient LEDs maximize the utility of the solar panels and batteries, ensuring lights can run for the whole night on a single day's charge.

The LED and solar units are also designed for durability (with weather-proof, rust-proof construction), resulting in minimal maintenance and waste. Unlike conventional streetlights, which might require frequent bulb replacements, these LED systems have long lifespans, reducing the waste of materials and the environmental footprint associated with manufacturing and transporting replacement parts. The focus on efficiency and sustainability in design means the environmental impact of providing lighting is kept as low as possible, consistent with the project's green objectives.



QUANTITATIVE IMPACT ASSESSMENT

Environmental Impact Indicators:

Energy Efficiency and Carbon Footprint

- Energy Consumption: 45% reduction in per-unit energy consumption compared to traditional lighting
- Carbon Emission Reduction: Estimated 78 tones CO2 equivalent reduction annually
- Renewable Energy Integration: 80 solar units contributing 584 kWh clean energy generation annually
- Grid Load Optimization: 23% reduction in peak hour electricity demand in project villages

“Since the streetlights came and SEED’s BCC sessions started, our evenings are cleaner and safer—families now switch off lights when not needed. We also learned how proper lighting can deter animals without harming them. It feels like we’re safeguarding the Sundarbans while caring for our children.”

**— Sabitri Mondal, SHG member,
Kamalpur, Namkhana Block**



CHALLENGES FACED & ACTION TAKEN

Challenge 1 : O&M Capacity Gaps

Why it mattered: The coastal, high-salinity environment and intermittent grid supply meant fixtures needed routine checks and occasional repairs. Without local skills and a clear reporting line, even small faults could lead to prolonged outages and loss of community confidence.

Action taken:

- Local maintenance cadres: We identified youth and SHG members in each village and trained them on electrical safety, basic diagnostics (fuse/driver/MCB checks), preventive cleaning and simple repairs.
- Real-time reporting: Village WhatsApp groups were set up with a standard fault template (pole ID, symptoms, photo/video). Issues now route to the Project Supervisor with an escalation ladder to the Project Manager.
- Monthly joint walk-throughs: Cadres and supervisors conduct lane-wise inspections (lux checks, corrosion spotting, cable integrity), log observations, and pre-empt failures before they occur.

Result- Faster fault detection, shorter downtime and stronger community ownership. The structured O&M has aligned field response with the 72-hour service target in most cases while reducing repeat faults through preventive care.

Challenge 2: Site Permissions & Right-of-Way Delays

Why it mattered: Installations required coordination across panchayats, utilities, and community stakeholders. Typical bottlenecks included line-of-route disputes (private verandas, shopfronts), clearance from overhead lines and environmental sensitivities near mangrove edges and ghats.

Action taken:

- Pre-installation MoUs: Framework agreements with Gram Panchayats and utilities clarified roles (site access, safety clearances) and sped up approvals.
- Single-window sign-off: The Project Manager led a consolidated checklist (layout map, load/safety notes, photos, consent letter) so field teams didn't chase multiple signatures.
- Participatory siting: Street-by-street meetings with residents, shopkeepers, and SHGs finalized pole locations, resolved frontage concerns, and documented consent to avoid later disputes.
- Transparent documentation: Village notice boards displayed final siting maps and a simple grievance contact, creating a social license for works.

Result- Streamlined permissions, fewer last-minute relocations and smoother installs—reducing idle time for crews and ensuring lights went up where they deliver the greatest safety and access benefits..

LIGHTING LIVES IN THE SUNDERBAN

"LIGHTING PROGRAMME WITH ENERGY EFFICIENT LEDS AND SOLAR STREET LIGHTS."

Supported By:

Signify Innovations India Ltd.



Implemented By:

SEED



A PROVEN MODEL FOR SAFE & SUSTAINABLE RURAL ELECTRIFICATION



Installed 80 solar streetlights in off grid Ghoramara island across 6 villages and 1700 energy efficient LED street lights with grid connectivity covering 28 villages in Pathar Pratima, Namkhana and Sagar Blocks of South 24 Parganas, West Bengal; enhancing safety, sustainability and livelihoods.



Powering a Greener Future



Carbon Emission Reduction: Estimated 78 tones CO2 reduction annually



80 solar street lights units contributing 584 kWh clean energy generation annually



23% reduction in peak hour electricity demand in project villages



Boosting Economic Growth



Marketplaces now remain open longer even after dusk, hence income has increased by 30%.



Improved night time work opportunities in fishing, net weaving, betel leaf stacking etc. increased household income by 25%.



34% improvement in efficiency of evening economic activities



Improved Education, Women and Child Safety



45% increase in overall attendance at evening tuition classes, particularly among girls.



84% of women respondents reported feeling safer to move during evening hours (6 PM - 10 PM).



91% of parents now allow children to participate in evening educational and recreational activities.



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CONCLUSION

By bringing sustainable lighting to underserved climate affected villages, the initiative has enhanced quality of life and livelihood opportunities while safeguarding the environment. These results shows that even a basic infrastructure improvement like street lighting can have far-reaching effects: from safer, more cohesive communities and thriving local markets to cleaner air and better-protected wildlife. Importantly, the project's success provides a model for other regions – it shows that sustainable energy solutions can effectively drive rural development in an eco-sensitive manner. As noted by the project team, this approach is highly replicable in other under-developed districts, promising to “help many people to have better lives” through similar initiatives.

Moving forward, continued community engagement and periodic monitoring will be crucial to sustain these gains. The local maintenance capacity developed by training villagers will support the long-term functionality of the lights. In nutshell, the impact of the project has been profoundly positive: it not only lit up the nights in Sundarbans villages, but also illuminated a path toward safer communities, stronger local economies and a greener future for the region.

