

## Socio-Economic Impact Assessment at Sagar Island in Respect of Grid Availability

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### Abstract

The focus of the paper is based on the state of West Bengal's Sundarban region. The Sundarban forests lie in the southern part of the state. It comprises 104 island groups out of which 54 are inhabited. Sagar Island, the focus of my study, is the largest island in this area having an area of 286 km<sup>2</sup> and a population of more than 1.6 lakhs. This island is situated 5 km adrift on the mainland of India. Due to the presence of River Muriganga (Hooghly), this island could not be connected to the national grid. So, the power requirement was fulfilled by the Diesel Generator sets run by WBSEDCL, 9 Solar Photovoltaic Plants located in the strategic areas, and one Wind-Diesel Hybrid Plant run by WBREDA so that the minimum power requirement could be met. In this paper, the focus of the study will be on the people of Sagar Island on how they will be benefited from the conventional grid in order to improve their lifestyle and economy and also study the future of renewable projects and the existing off-grid system prevalent in this island.

**Keywords:** Grid availability, Socio-economic impact assessment, Decentralized Distributed Generation (DDG), Mini-grid system, Solar Energy, Wind Energy, Sundarban Islands.

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## Literature Survey

India is a developing country, where per capita energy consumption is below the average energy consumption in other parts of the world. Power availability has a direct impact on the economy of the nation, and it also affects our day-to-day life. Business, health, education, entertainment, and any social activities are directly or indirectly impacted. In a study undertaken in 2008, household electrification can impact in increasing literacy rate in rural areas of Assam <sup>[1]</sup>.

According to the 2011, census the total population of Sagar Island is 2, 12, 037 and the population of the island was 1, 85, 644 in 2001 <sup>[2]</sup> but the majority of the people are living below the poverty line (BPL), which is defined as an income group with a family income of not more than Rs 32 per day. This increased rural population struggling to sustain on the finite ecological resources of the region poses multi-level challenges to all three aspects of sustainable living i.e. environmental, social and economic. Energy is one of the common drivers of these three parameters of development, its supply becomes a crucial aspect to achieve overall island sustainability <sup>[3]</sup>.

Sundarban is a sensitive area, both ecologically and economically, where inhabitants lack proper basic amenities, purchasing power, technological awareness, and capacity generation for sustainable development of the community. The demand for electricity for the sustainability of the business is increasing day by day. Dependency on solar energy has been always there as Sagar Island has a local mini-grid system that is being run on a community level. <sup>[4,5]</sup> The availability of the national grid has helped to some extent, but lots of development needs to be done for proper rural electrification <sup>[6,7]</sup>. The reported literature <sup>[8]</sup> shows sustainable electrical energy to the isolated Sagar Island for the sustainable development of the local people and biomass and a fuel cell-based electricity generation system.

## Research Objective:

- To study the impact of grid connectivity and local mini-grid system on the lifestyle of the people of *Sagar* Island through the survey.
- To do an impact assessment study on the business of local distributors/ shopkeepers due to grid connectivity.
- To determine whether the source of household electricity is dependent on the level of income.

### Research Methodology Used

The researcher administered the primary data analysis, i.e. primary data from the respondents is collected through structured questionnaires for local people and local shopkeepers/ distributors. Simple percentage analysis is carried out throughout the project for drawing inferences. Various statistical tools like Pie-charts, Bar Charts, and Radar Chartshas also been used for drawing inferences. Further analysis is carried out through Chi-Square ( $\chi^2$ ) Testing to determine the impact of income on household electricity sources at a 5% Level of Significance. The sample size is considered 90 and the time period allocated for conducting the research is 2 months.

### Findings and Conclusions:

- The first local mini-grid system in *Sagar* Island was installed in 1972 by WBSEDCL with a customer base of 4. During the course of time, the customer base increased up to 613 till October 2011. All the WBSEDCL consumers have metered connections and the energy consumed is reflected on the meter. The billing was done on the basis of the rate fixed for the rural consumers of West Bengal which is being covered by WBSEDCL. The generators used to run for 4 hours in the evening (6 PM to 10 PM on average).
- Line loss has been negligible as the power being generated locally, doesn't need to be transmitted to a long distance (read 34 Km of HT lines and 54 km of LT lines. AT&C losses were around 7% whereas T&D losses were around 8%. Power theft never took place before grid connectivity on the island. Revenue collection was around 2-2.5 lakhs per month and during *Ganga Sagar Mela*, a Hindu festival celebrated in the month of January, it increases up to 3.25 lakhs during that month.

- WBREDA came into existence in 1993 and since then they have been working on installing solar PV plants on the island. Since 1998, 9 Solar PV plants have been installed on the island and each plant has been providing electricity to the local people in their command area for 6 hours a day. Billing is done on the basis of the number of points/connections provided in the household. However, new solar plants are not coming up and maintenance of the existing plants is in shambles. People are now mostly dependent on the solar home light system.
- From the concordance data analysis, we conclude that the local people have benefitted from both the local mini-grid and grid connectivity. Emergency services have greatly improved after the grid connectivity in the island due to 24 hours supply of electricity. The impact on business has been positive according to the local shopkeepers/distributors. On the contrary, sales figures of the solar appliance distributors have dipped by 70%. People are willing to buy electrical appliances after grid connectivity, but they prefer to buy it from either Kolkata or Kakdwip, the nearest town on the mainland.
- From Chi-square Testing, we found out that there is an impact of income on the source of household electricity connection.

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