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A STUDY ON THE SOCIO-ECONOMIC IMPACT OF SOLAR PARKS ON FARMERS

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ABSTRACT

The increasing emphasis on renewable energy in India has led to the development of large-scale solar parks, often established on agricultural land. While these projects contribute to national energy goals and climate commitments, their socio-economic implications on the local farming communities remain under-explored. This study investigates the socio-economic impact of solar parks on farmers by examining changes in income patterns, employment opportunities, land use, migration trends, and community development. Using both qualitative and quantitative research methods, the study incorporates case studies from solar parks in Rajasthan, Gujarat, Andhra Pradesh, and Karnataka. Findings reveal a complex mix of positive and negative outcomes. While some farmers benefit from land leasing and new job opportunities, others face displacement, reduced agricultural activity, and socio-cultural disruption. The paper concludes with policy suggestions to ensure that solar expansion promotes inclusive and sustainable rural development.

Keywords : Solar Energy, Solar Parks, Farmers, Land Use, Rural Economy, Socio-Economic Impact, Renewable Energy Policy, Sustainable Development

INTRODUCTION

India's ambitious transition toward clean energy has positioned solar power as a cornerstone of its renewable energy strategy. With the aim of achieving 500 GW of non-fossil fuel-based capacity by 2030, the Government of India has launched several initiatives, including the Solar Park Scheme. These parks are large-scale photovoltaic (PV) installations developed to centralize solar power production and supply it to the grid. While the environmental and energy-related benefits of these projects are well-recognized, the socio-economic consequences on rural populations—especially farmers whose lands are acquired or leased—are less thoroughly examined.

The rural landscape, where solar parks are predominantly established, is undergoing significant transformations. The shift from traditional agriculture to solar infrastructure alters not only the economic structure but also the social fabric of these communities. Farmers face a trade-off between stable lease income and the loss of agricultural livelihood. This study aims to fill the research gap by providing a systematic analysis of the socio-economic impact of solar parks on farmers across different regions of India.

REVIEW OF LITERATURE

Several scholars have addressed the environmental and economic feasibility of solar energy projects in India. However, fewer have explored their impact on rural livelihoods and land use.

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Socio-economic displacement: Sati (2021) notes that land-use change associated with solar park development often leads to the displacement of agricultural activities, affecting food security and rural employment. While compensation is provided, it does not always translate into long-term socio-economic security.

Income diversification: According to Chaudhary et al. (2020), farmers leasing their land to solar developers experience a significant increase in income, with guaranteed annual returns. However, the benefits are unevenly distributed and often limited to landowners, leaving out tenant farmers and agricultural laborers.

Land acquisition challenges: A report by the Centre for Policy Research (2022) highlights issues in land acquisition for solar parks, including non-transparent negotiation processes, undervaluation of land, and lack of post-acquisition support systems for affected communities.

Need for integrated planning: Jain and Shah (2019) argue for an integrated approach to renewable energy development that considers local socio-economic contexts. They advocate for hybrid land-use models where solar generation coexists with agriculture (agrivoltaics).

This study builds on the existing literature by offering a ground-level view through region-specific case studies and capturing both the economic and cultural dimensions of the impact.

METHODOLOGY

The study adopts a **mixed-methods approach**, combining quantitative data analysis with qualitative field insights.

1. Data Collection

- **Primary Data**: Semi-structured interviews with 80 farmers across four states (20 from each site), along with local officials and NGOs.
- **Secondary Data**: Government reports, solar project documents, census data, and academic literature.

2. Case Study Locations

- Bhadla Solar Park (Rajasthan)
- Charanka Solar Park (Gujarat)
- Kurnool Ultra Mega Solar Park (Andhra Pradesh)
- Pavagada Solar Park (Karnataka)

3. Indicators Used

- Land leasing income vs. prior agricultural income
- Employment opportunities created
- Migration trends (inward/outward)
- Local business and service development
- Environmental and social perception

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Case Studies

Case 1: Bhadla Solar Park, Rajasthan

One of the largest solar parks in the world, Bhadla spans over 14,000 acres in the arid region of Rajasthan. Farmers here have leased land at approximately ₹20,000 to ₹25,000 per acre annually.

Impact:

- **Positive**: Increase in steady income; reduced dependence on erratic rainfall.
- **Negative**: Loss of agricultural identity; limited jobs for youth due to lack of skills.

Local Sentiment:
Elderly farmers appreciated the stable lease income, but younger generations expressed concern over the lack of alternative employment in the region.

Case 2: Charanka Solar Park, Gujarat

Charanka Solar Park has incorporated partial agrivoltaic models. Some sections allow sheep grazing under solar panels.

Impact:

- **Positive**: Continued land productivity; increased employment during installation.
- **Negative**: Low participation of small farmers; lack of training for long-term employment.

Local Sentiment:
Community leaders welcomed the infrastructure development, but called for better inclusion of landless laborers.

Case 3: Kurnool Solar Park, Andhra Pradesh

Developed in a drought-prone region, Kurnool Solar Park aimed to improve economic resilience.

Impact:

- **Positive**: Boosted regional image; development of roads and connectivity.
- **Negative**: Allegations of unfair land acquisition; no long-term employment for locals.

Local Sentiment:
While infrastructure improved, many farmers missed their connection to agriculture and felt sidelined.

Case 4: Pavagada Solar Park, Karnataka

Pavagada followed a lease-based model where farmers retained land ownership, earning annual rent.

Impact:

- **Positive**: Transparent lease system; increased disposable income.
- **Negative**: Dependency on lease income; reduced food production in the area.

Local Sentiment:
Overall positive, but some farmers expressed concern about rising costs of living due to reduced subsistence farming.

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Impact Analysis

Economic Impact

- **Income Security**: Leasing provides predictable income, often higher than crop earnings.
- **Reduced Risk**: Farmers no longer face risks from failed monsoons or market volatility.
- **Loss of Agriculture**: Farmers are disconnected from farming, leading to dependency on lease and potential loss of skills.

Social Impact

- **Migration Trends**: Younger members often migrate for employment as agriculture is no longer viable.
- **Cultural Erosion**: Farming as a way of life is declining.
- **Community Inequality**: Benefits largely accrue to landowners, while landless laborers face job loss.

Environmental Impact

- **Land Use Change**: Loss of green cover and soil degradation in some areas.
- **Water Table**: Some parks led to water conservation due to less irrigation, others affected local ecosystems.

Challenges Identified

1. **Lack of Inclusion**: Marginal farmers and laborers are excluded from benefits.
2. **Displacement without Rehabilitation**: In cases of acquisition (not leasing), many were displaced with minimal support.
3. **Loss of Agricultural Knowledge**: Detachment from farming may be irreversible.
4. **Inadequate Local Employment**: Most jobs during construction are temporary; few long-term roles for locals.
5. **Environmental Concerns**: Large-scale land transformation may impact micro-climates and biodiversity.

Suggestions

1. **Promote Agrivoltaics**: Allow dual use of land for both solar energy and farming (e.g., grazing, short crops).
2. **Inclusive Compensation Models**: Ensure benefits extend to tenant farmers and laborers, not just landowners.
3. **Skill Development**: Provide training for solar park-related employment (technicians, maintenance).
4. **Transparency in Land Deals**: Ensure informed consent and fair compensation.
5. **Community Development Funds**: Use a portion of solar revenues for local schools, health centers, and roads.
6. **Environmental Planning**: Conduct impact assessments and promote biodiversity in and around solar parks.

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CONCLUSION

Solar parks represent a significant step toward a greener future, but their success must be measured not just in megawatts but in meaningful socio-economic outcomes for the communities they impact. The case studies reveal a mixed picture—while financial benefits are real and significant, they are not universally shared, and the erosion of rural livelihoods poses a long-term risk. A balanced policy approach that values sustainability, inclusion, and local participation is essential to ensuring that solar parks become engines of holistic rural development rather than silent displacers.

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