

UPSC Syllabus Topic: GS Paper 3 – Disasters and disaster management

On Char Dham Tunnel Collapse – Unrestrained Construction

There have been several incidents in these areas, indicating a pattern of challenges and dangers associated with such projects.

Subansiri Lower Hydroelectric Power Project: A major landslide disrupted construction and blocked diversion tunnels.

Teesta River Flash Floods: Flash floods damaged the Chungthang Dam and Teesta hydropower stations, leading to significant financial losses.

What are the reasons behind frequent incidents in the Himalayas?

Disaster-prone area: The region is increasingly vulnerable to landslides, flash floods, and earthquakes, exacerbated by climate change.

Ignorance of technical and environmental appraisal: Minimal appraisals are being undertaken. These are not just bureaucratic hurdles but are crucial for the safety and sustainability of manpower and the environment.

Himalayan Biosphere: The Himalayas are recognized as a unique and sensitive biosphere that requires special care and preservation.

What should be done?

Assessment over political will: Political will for socially significant projects such as Char Dham should not be prioritized over technocratic assessments of whether they are feasible.

Environmental Impact: The article underscores the need to consider the ecological impact of construction projects in this fragile region.

UPSC Syllabus Topic GS Paper 3 – Indian Economy – Infrastructure and Energy – Solar energy

Solar Energy Mini-Grids: Enhancing Energy Security with Solar Assistance

What are Solar Energy Mini-Grids?

Solar energy mini-grids are small-scale, decentralized electricity networks powered by solar energy. Unlike traditional large-scale power grids, solar mini-grids are localized and can operate independently. They can produce energy ranging from a few kilowatts up to 10 megawatts. They are primarily used to provide electricity to rural communities that lack access to the central power grid.

What are the Developments around the Use of Mini-Grids?

Nigeria: Over 90 million people in Nigeria live without electricity. The World Bank aims to fund a thousand mini-grids there, as part of a broader goal to bring electricity to 75% of the 675 million

people worldwide living without it. 20,000 mini-grids have been installed to date.

In Cambodia, diesel-powered mini-grids evolved into part of the national grid, now serving over 1 million consumers.

In India, around 700 solar mini-grids are operated by a handful of private companies. These grids are mainly in UP, Bihar, and Jharkhand, contributing to sustainable development goals. States like UP and Bihar have introduced regulations to encourage private-sector mini-grid setups. These grids are commercially viable and unsubsidized, unlike state-run grids.

What are the Significances of Mini-Grids?

- **Economic and Environmental Benefits:** Solar mini-grids offer a cost-effective, sustainable alternative to diesel generators. They are instrumental in reducing reliance on fossil fuels and promoting renewable energy.
- **Decentralized Energy Systems:** In the absence of centralized grid infrastructure, these grids are crucial in climate-vulnerable regions, offering resilience against climate shocks like drought and flooding.
- **Development Accelerators:** Beyond providing electricity, these grids facilitate various rural development services, enhancing the quality of life and economic opportunities in rural areas.
- Mini-grid companies are also providing mobile telephony, irrigation, agro-processing, and e-mobility.
- The cost of solar PV energy is now highly competitive, standing at \$24/MWh, lower than both coal and natural gas.
- **100% Electrification in India:** Under the Pradhan Mantri Sahaj Bijli Har Ghar Yojana ('Saubhagya'), in March 2019, the government declared 100 percent electrification of all 'willing' households. Still, this effort was aimed at extending the reach of grid electricity, which does not specifically address the quality and reliability of electricity supply. Mini-grids are important in improving the reliability of electricity services.

What are the Challenges of Installing Mini-Grids?

- **Funding Requirement:** Despite being the cheapest source, only 10 percent of the amount required to achieve net-zero emissions has been invested in solar energy.
- About \$220 billion is required to build 210,000 mini-grids needed globally. Currently, solar investments are only 10% of what is needed for net-zero emissions.
- **Energy Bias:** There is a bias towards favoring large-scale solar projects on the national and international level. International frameworks like ISA (International Solar Alliance) are favoring such bias.

What Should Be Done?

- **Energy Mix:** There is a need for a diverse energy mix, which is focused on adequate centralized and distributed renewable generation.
- **Financial Mechanisms:** Implementing guarantees and innovative financial mechanisms, along with robust risk underwriting, can catalyze private sector investment in solar mini-grids.
- **International Support:** Initiatives like the ISA's Global Solar Facility aim to catalyze investments in solar projects, especially in underserved regions. Similar initiatives are required for mini-grids as well.