

AGiSAC Achieves Excellence in Solar Power Plant Installation with ArcGIS

Client

Aryabhata Geo-Informatics & Space Application Centre (AGiSAC)

Industry

Space

Organization Profile

Aryabhata Geo-informatics & Space Application Centre (AGiSAC) is committed to bringing geo-information for the benefit of people and sustainable development to facilitate decentralized planning and decision-making. It helps to facilitate the monitoring and evaluation of government schemes and programs and to set up an integrated natural resources data management system. Along with it, AGiSAC is providing services/consultancy based on specific user needs in the field of Remote Sensing and GIS and wider usage of geospatial applications through simultaneous support systems/ software.

Website

www.agisac.gov.in

Project

Solar Site Identification Using ArcGIS

Highlights

- AGiSAC has used ArcGIS spatial analysis tools to streamline the complex process of running suitability analysis.
- ArcGIS has proved invaluable in the analysis of both raster and vector datasets.
- Use of ArcGIS has significantly reduced the number of hours spent on field surveys and provided high-quality results.

Project Summary

In collaboration with Himachal Pradesh Electricity Regulatory Commission, AGiSAC has carried out a study to identify suitable sites of land for Solar Power plant installation. Disparate datasets such as imagery, DEM, land use, settlement clusters, and locations of existing infrastructure such as roads and electricity sub stations were used in ArcGIS Pro spatial overlay analysis to find suitable sites along with solar power potential calculated in MW. Following the GIS study, field visits were undertaken to verify the optimum locations.

Challenges

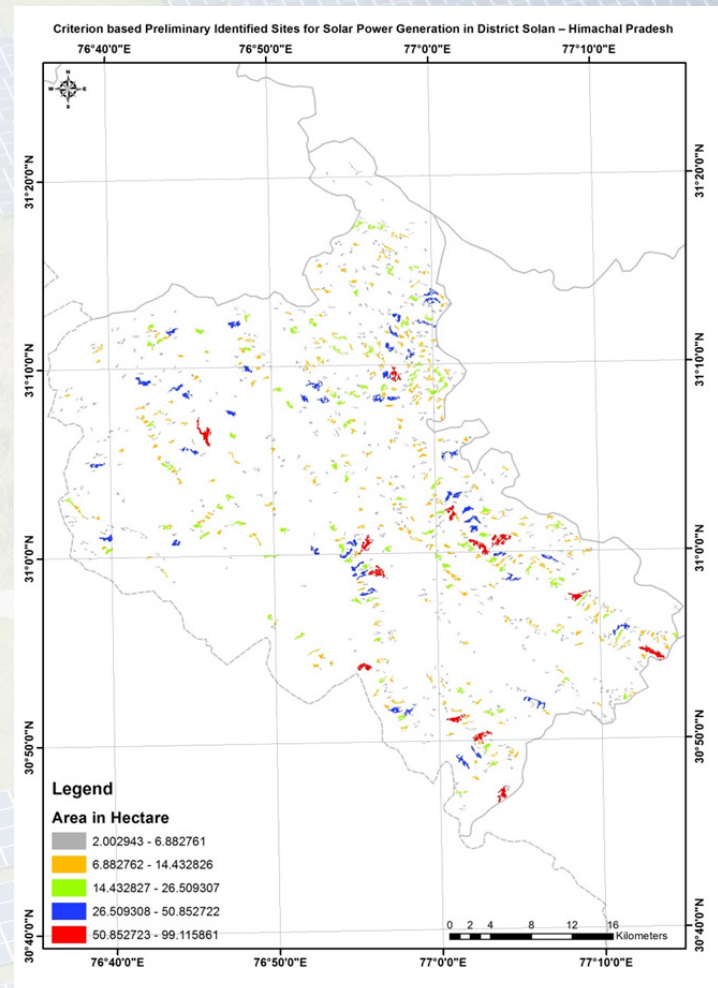
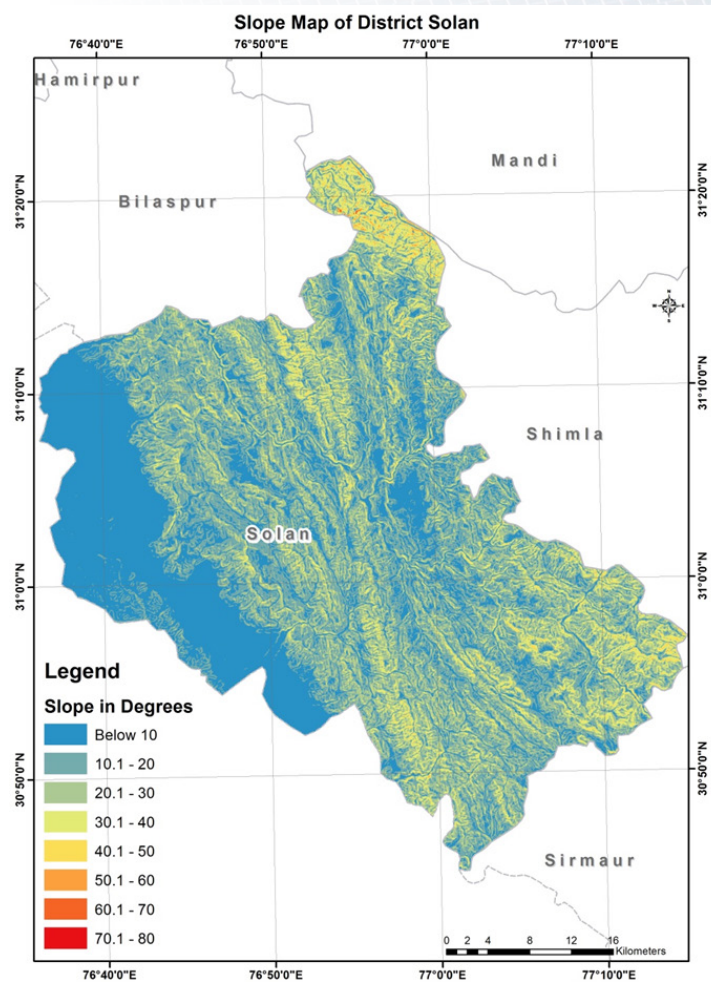
Before the prevalence of remotely sensed data, field surveys had to be carried out by teams of scientists and engineers over a period of several months. Data collection was an expensive and laborious process, especially due to the mountainous terrain of Himachal Pradesh. Large volumes of data collected in disparate forms were difficult to collate and analyze as there was no single platform that could ingest tabular and spatial data simultaneously. Suitability calculations had to be done manually, adding up to thousands of hours across the state.

Solution

AGiSAC has used ArcGIS spatial analysis tools to streamline the complex process of running suitability analysis. The ArcGIS Desktop platform provides an interface where raster, vector, and tabular data can be ingested and analyzed. The Suitability Modeler tool allows disparate datasets such as DEM, satellite imagery, LULC maps, as well as vector datasets such as roads and human settlement, to be overlaid to delineate suitable areas according to user-defined thresholds.

ArcGIS has proved invaluable in the analysis of both raster and vector datasets. The user was able to carry out advanced proximity analysis to measure the accessibility of potential Solar Power Plants to existing roads and electric substations. High-resolution land use maps were also created using image classification tools on CARTOSAT-1 imagery. Tracts of barren land extracted from this classification were identified as the most suitable land use type for Solar Power plant installation.

The suitability modeler tool then overlaid all the resultant layers and applied a uniform user-defined index to assess the suitability of each class for the construction of a PV plant. Several zones that best matched each user-defined threshold were then extracted from each district, which was further verified via field survey.



Benefits

ArcGIS provides a single platform capable of analyzing raster and vector data. Several inbuilt tools allow users to perform complex workflows without coding. Users at AGiSAC were able to save time on field data collection, and instead devote resources to analysis. In the traditional methodology, a majority of time is spent on getting approvals for site visits from local bodies and gathering site knowledge from experts and scientists regarding site suitability parameters such as land use, slope, aspect, terrain, etc. Due to the hilly terrain of Himachal, it takes more than a month to cover each district in detail.

Through remote sensing, this data could be easily gathered from satellite data and analyzed in ArcGIS within a matter of hours. More than 80% of optimum locations selected through the Suitability Modeler were verified as suitable through ground truthing.

“ ArcGIS software has significantly reduced the number of hours spent on field surveys. Previously, entire districts had to be inspected to record on-ground conditions. Remote sensing has allowed us to reduce our time in collecting raw data and direct our resources towards analysis. Using inbuilt spatial analysis tools, we were able to conduct proximity analysis to find out the accessibility of potential Solar Power Plants from existing roads and electric substations. The results from spatial overlay analysis have also reduced the number of field visits required to verify a site for suitability – focusing only on those that best meet our requirements as defined in the model thresholds. Overall, the use of ArcGIS has saved us a lot of time and given us high-quality results.”

- Dr Brijesh Saklani, Sr. Scientific Professional, AGiSAC