

India SiteRight 2.0 Data Documentation

Data

All datasets are maintained in Albers Conical Equal Area projection & 56 m resolution as defined by the NRSC 2023 LULC250k data.

Development Potential

Development potential models across India were created by Jeff Evans in 2019/2020 using a Random Forest predictive model. A global model across India was developed and then applied to state-level parameters. All data described below are combined outputs from all state models done in 2019 and later updated in 2020.

- Solar_DP.tif – Final solar development potential model ranging in values from 0 (very low) to 1 (highest) development potential across all states which were modeled.
- Wind_DP.tif – Final wind development potential...

Percent Volumes

All data found in this folder contained the combined, India-wide percent volumes produced from each state development potential model. These are the top pixels based on percentage of development potential values across each state (e.g., 10 would indicate top 10% of pixel values). Each volume dataset is identified by the development potential (i.e., wind or solar) and the volume mapped (e.g., solarP10.tif). These dataset were intersected with low conflict areas to created potential areas of development within the planning app.

Exclusions

All data identified by Table 1 are binary, TIF raster datasets with a value of 1 indicating area excluded.

Table 1: Current Pan India Solar and Wind Energy Individual Exclusions

Exclusion (filename in box folder)	Method	Source	RE Exclusion	Exclusion Category
Built-up (built_up.tif)	Selected Built-up (i.e. value =1)	LULC250k – NRSC 2023	Both	Technical
Population Center -- Major urban areas and cities (pop.tif)	Major urban: From GSH SMOD 2025 selected value 30 as major urban and limited to only built-up lands as identified by LULC250k- 2023 data, maintaining 56 m resolution, then expanded identified area by 4 pixels ~ 224m	GHS SMOD 2025 LULC250k – NRSC 2023	Both	Technical

	Cites: From GSH SMOD 2025 selected values 13, 21-23 as cities and limited to only built-up lands as identified by LULC250k- 2023 data, maintaining 56 m resolution, then expanded identified area by 2 pixels ~ 112m			
Airports (airp10k.tif)	Buffered airports by 10 km and used cell centroid for raster conversion	OSM 10/2024 download Airports	Wind Only	Technical
State and national highways (road50m.tif)	Major Roads OSM: Selected fclass="motorway", "trunk", "primary", "secondary", "tertiary" with links of each Buffer by 50 m, then select any cell with > 50% coverage by buffer.	OSM 10/2024 download	Both	Technical
Railways (rr100m.tif)	OSM selection fclass="rail" Buffer by 100 m, then select any cell with > 50% coverage by buffer	OSM 10/2024 download	Both	Technical
Forested lands (forest.tif)	Selected woodlands = 8,9,10 (8-Evergreen, 9-Deciduous, 10-Degraded)	LULC250k – NRSC 2023	Both	Environmental
Croplands (crops.tif)	Selected crops: 2-Kahrif, 3-Rabie, 4-Zaid, 5-double/tribble/annual, 7-plantations/orchard. **Additional dataset, CropsWithVals.tif identifies these crop types.	LULC250k – NRSC 2023	Solar Only	Environmental
Protected Areas: national parks, wildlife sanctuaries, tiger reserves, and tiger corridors (PAwii.tif, tiger.tif)	Converted to raster by identifying any amount of pixel overlap as protected or designated area	Wildlife Institute of India (2020) National Tiger Conservation Authority (NTCA) https://ntca.gov.in/dss/#decision-support-system , downloaded oct 2024	Both	Environmental
Slope threshold (slope > 8 degrees) for solar (slopeGt8.tif)	calculate slope at 30 m, resampled using bilinear to match analysis resolution (56 m)	NASADEM 2020	Solar Only	Technical
Slope threshold (slope > 13.5 degrees) for wind (slopeGt13pt5.tif)	calculate slope at 30 m, resampled using bilinear to match analysis resolution (56 m)	NASADEM 2020	Wind Only	Technical

Water bodies and buffer zones (waterMin500Max100Ls100.tif)	Selected values 11-Littoral Swamp/Mangrove, 15-Rann, 16-Waterbodies-Max and buffered by expanding by 2 pixels ~112 m Selected value 17 (Waterbodies - Min spread 500m) and expanded by 9 pixels ~ 504m	LULC250k – NRSC 2023	Both	Environmental
Current Solar Development (existingSolarFarms.tif)	GReW solar farm polygons >50% overlap of pixel	GReW 2024	Solar Only	Technical
Current wind development (existingWindTurbinesWithPixelBuf.tif)	GReW wind turbine points + 500 m buffer (>50% overlap of pixel)	GReW 2024	Wind Only	Technical
Wind speed < 5 m/s (windLt5mps.tif)	identify areas with wind speed of less than 5 meters/second	Global Wind Atlas, 2024 Wind speed at 100 meters hub height according to a global 10 year weather model	Wind	Technical
Snow Covered/Glacial areas (snow_ice.tif)	Selected Snow Covered/Glacial area (i.e., value = 18)	LULC250k – NRSC 2023	Both	Technical

Merged Exclusions

- Combined all individual exclusions into one dataset identifying RE exclusion with a value of 1 (AllSolar.tif and AllWind.tif).
- Combined all individual exclusions into one dataset identifying RE exclusion with a value identifying the exclusion category: technical only=1, environmental only=2 & overlapping pixels of both=3 (AllSolar_Tech1_Env2_Both3.tif & AllWind_Tech1_Env2_Both3.tif)

Low Conflict

Wind and solar low conflict areas were created by mapping all exclusions listed in Table A1 and then selecting those lands without any exclusions. Minimum contiguous lands 40 ha in size for solar and 5 km² in size for a potential wind farm were considered adequate suitable low conflict lands to accommodate large-scale development.

- Solar_LowConflict40ha_Priority2_Other1.tif – Identifies solar priority areas (i.e., contiguous/touching pixels, using 4-neighbour rule, that are greater in size than 40 ha) with a value of 2 and all other low conflict pixels not selected as a priority pixel with a value of 1.
- Solar_LowConflict_AllCells.tif - Identifies all low conflict solar pixels across India with a value of 1.
- Solar_LowConflict_AreaGt40ha.tif – Identifies only solar, low conflict, priority pixels with a value of 1.
- Wind_LowConflict_AllCells.tif - Identifies all low conflict wind pixels across India with a value of 1.
- Wind_LowConflict_Area5km2plus.tif - Identifies only wind, low conflict, priority pixels with a value of 1.

- Wind_LowConflict_Priority2_Other1.tif – Identifies wind priority areas (i.e., contiguous/touching pixels, using 4-neighbour rule, that are greater in size than 5 km²) with a value of 2 and all other low conflict pixels not selected as a priority pixel with a value of 1.

Other Environmental Data

- India_ONE_EA_gteq0pt5as1.tif – selected all pixels with at minimum 50% overlap with the Open Natural Ecosystems dataset (*Madhusudan and Vanak, 2021, <https://doi.org/10.1111/jbi.14471>*)
- ReforestPotential_EA.tif - Reforestation Potential (followed Heiner et al. 2019 methods with updated NRCS 2023 landcover data)
 - Must have a historic (1930) forest fraction > 0% (Reddy et al. 2016).
 - Currently classified as non-forested land cover, i.e., not deciduous, evergreen, or degraded/shrub (NRSC 2023).
 - Are within 2 km of existing forest patches (i.e., “deciduous”, “evergreen”, or “degraded/shrub”, NRSC 2023) > 1 km² in size.
 - Undeveloped, removed any pixels classified as “built-up” (NRSC 2023)
 - Not high production agriculture, removed any pixels identified as “double/triple crop” (NRSC 2023).
 - Not permanent or seasonal water bodies, removed any pixels identified as “waterbodies – min” (NRSC 2023).

Social

Social Assessment Data – FES 2020, 12 indicators produced using 2011 India Census data (FES data, descriptions [here](#)). FES currently does not allow for these data to be shared or displayed without their permission. Current work with Ash Bhattacharjee, TNC Social Scientist and RE India team is ongoing with FES. Potential future paper and possible updates may occur. Data were originally mapped to village boundaries and converted to raster. All raster datasets are standardized to 0-1 either by scaling, transformation, and/or using proportion of village values.

Table 2. FES Indicator name with associated file name in database.

Indicator	File Name
% of forest land to total geographical area	forest.tif
% of common land (grazing land, culturable wasteland, barren land and non-current fallows) to total geographical area	commonland.tif
Livestock holding per household (Cattle, Buffaloes, Goat and Sheep numbers are considered as livestock)	livstk_hh.tif
% of households depended on fuelwood for cooking	firewood.tif
% of rainfed land to total agricultural land	rainfed.tif
% of households with walls made of grass, thatch, bamboo, wood, mud	mwall_gtb.tif
% of households with main drinking water source as wells, handpumps, rivers, canals, springs, tanks, ponds, tubewells	drinkingwater.tif
% of SC to total population	sc.tif
% of ST to total population	st.tif
Availability of markets	market.tif

Availability of pucca road	road.tif
Distance from Sub-District headquarter	sdhq_dist.tif
Final Composite Map (i.e. overall social score)	vill_raster.tif

Species AOH Maps

These are all available area of habitat (AOH) species maps (Brooks et al., 2019 and Lumbierres et al., 2022) within India and currently mapped. Sub-folders contain each class of species available (i.e., amphibians, birds, mammals, reptiles). Each AOH raster dataset is named to identify the scientific name of the species mapped (e.g. *Aceros_nipalensis*). Bird datasets may have a 1, 2, or 3 following the scientific name, indicating 1=Resident, 2=Breeding, 3=Non-breeding. All pixel values identified with a value of 1 indicate that pixel is within the AOH for that species.

Other Vector Data

Table 3. Vector data with source

Feature Class	Source
Airports	OSM download 10/2024
Districts	Survey of India 2022 --
India_KBAs	Key Biodiversity Areas (KBAs), downloaded 1/2025, not displayed on map
India_Mainland Boundary	Survey of India 2022
India_State_Boundaries	Survey of India 2022 --
Protected areas	Wildlife Institute of India (2020) National Tiger Conservation Authority (NTCA) https://ntca.gov.in/dss/#decision-support-system , downloaded oct 2024
Power lines	OSM 10/2024 download
Power plants	OSM 10/2024 download
Power substation	OSM 10/2024 download
Railroads	OSM 10/2024 download
Roads All Major	OSM 10/2024 download
Roads Primary Only	OSM 10/2024 download
Solar Farms 2024 q2	Global Renewable Watch, 2024
SubDistricts	Survey of India 2022
TE List with IUCN Status and Common Name	IUCN Redlist of Threatened Species , downloaded 10/2024
Tiger Reserves Corridors	Wildlife Institute of India (2020) National Tiger Conservation Authority (NTCA) https://ntca.gov.in/dss/#decision-support-system , downloaded oct 2024
Wind Turbines 2024q2	Global Renewable Watch, 2024

Source Data

DEM - NASADEM, 30-m digital elevation model for all of India

GHSL - Settlement classification by the UN-recommended methodology “degree of urbanisation” from Global Human Settlement Layer data -- <https://human-settlement.emergency.copernicus.eu>

GReW July2024 - global renewable watch data for India, solar farms and wind turbines mapped up to July 2024

LULC25k 2223 - LULC250k – NRSC 2023

ONE - Open Natural Ecosystems dataset (*Madhusudan and Vanak, 2021*, <https://doi.org/10.1111/jbi.14471>)

OSM - All OSM data downloaded in Oct. 2024

Protected Areas & Tiger Reserves - Wildlife Institute of India (2020) National Tiger Conservation Authority (NTCA) <https://ntca.gov.in/dss/#decision-support-system>, downloaded oct 2024