Key Topics shortlisted

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1) Marine life 2) Mangrove 3) Biodiversity 4) Soil erosion 5) Crop yield

Data Sources (Free data sources)

1. Weather related

Weather data models- NOAA GFS (blueskyapi.io), ECMWF (most accurate, expensive), WRF( can be run to produce regional forecast, open community)

[PyOWM — pyowm documentation](https://pyowm.readthedocs.io/en/latest/)

For all the forecasts and data for soil, weather, UV, NDVI, air pollution etc. Uses openweather map data

Landsat 8 and Sentinel 2 satellite imagery

Other data sources – Accuweather,metoffice,Aerisweather

1. CO2 related

[GRACED, near-real-time Global Gridded Daily CO2 Emissions Dataset from fossil fuel and cement production (carbonmonitor-graced.com)](https://carbonmonitor-graced.com/methods.html)

Uses GID (global infrastructure emission database) and EDGAR emissions

[Global Energy Infrastructure Emissions Database (GID) is Released Online – GIDmodel](http://gidmodel.org.cn/?p=582)

[EDGAR - The Emissions Database for Global Atmospheric Research (europa.eu)](https://edgar.jrc.ec.europa.eu/archived_datasets)

1. Ocean related

[Marine Parameters | Meteomatics](https://www.meteomatics.com/en/api/available-parameters/marine-parameters/) (Is it free?)

[World Ocean Database | National Centers for Environmental Information (NCEI) (noaa.gov)](https://www.ncei.noaa.gov/products/world-ocean-database)

[Home | CMEMS (copernicus.eu)](https://marine.copernicus.eu/)

1. Coral reef data
2. Soil data - crop yield deep dive, soil biochemistry

[SEDAC | Earthdata (nasa.gov)](https://www.earthdata.nasa.gov/eosdis/daacs/sedac) - crop data

Suguna Suguna\_SR123

[Data Sets » Agriculture and Food Security | SEDAC (columbia.edu)](https://sedac.ciesin.columbia.edu/theme/agriculture/data/sets/browse/2)

Crop Yield data

1. BES related data - Pollination, bees etc.

Possible Use case

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| SNo. | Use case | Target variable | Data sources | References |
| 1 | Ocean PH level prediction based on Co2 data and ocean parameters (can further add impact on marine life if that data is available) | Ocean PH |  |  |
| 2 | Predictive Marine health Index based on 1. and a scale created to study the impact on phytoplankton, reefs, aquatic species data | Composite Marine index |  |  |
| 3 | GLAS data can be used to predict the canopy height which can be used to calculate biomass and further carbon capture based on the allometric equations + carbon conversion factor | Mangroves for carbon capture - |  |  |
| 4 | Crop Yield prediction due to weather patterns Rice |  |  |  |
| 5 | Prediction of food inflation based on 4. |  |  |  |
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Reference Papers/ Methods

[Efficacy of Machine Learning Models in Predicting Ocean pH Levels | by Aadyant Maity | Aug, 2023 | Medium](https://medium.com/@aadyant.maity06/efficacy-of-machine-learning-models-in-predicting-ocean-ph-levels-19b76b239dc9)

[Identification of climate induced optimal rice yield and vulnerable districts rankings of the Punjab, Pakistan | Scientific Reports (nature.com)](https://www.nature.com/articles/s41598-021-02691-4)

[DES | Area, Production & Yield - Reports (desagri.gov.in)](https://data.desagri.gov.in/website/crops-apy-report-web)

[An interaction regression model for crop yield prediction | Scientific Reports (nature.com)](https://www.nature.com/articles/s41598-021-97221-7)

[Paddy acreage mapping and yield prediction using sentinel-based optical and SAR data in Sahibganj district, Jharkhand (India) | SpringerLink](https://link.springer.com/article/10.1007/s41324-019-00246-4)

[Optimal Parameters for a Coral Reef Aquarium: By Randy Holmes-Farley | REEF2REEF Saltwater and Reef Aquarium Forum](https://www.reef2reef.com/threads/optimal-parameters-for-a-coral-reef-aquarium-by-randy-holmes-farley.173563/#:~:text=Optimal%20Parameters%20for%20a%20Coral%20Reef%20Aquarium%3A%20By,dioxide%20in%20the%20air%20is%20VERY%20common.%20)

Healthy coral reefs can soak up as much as 97% of wave energy, meaning that a loss of one-meter of reef height from a powerful storm could potentially double the cost of damage to coastal communities.

Mangroves Data Source and Science

* [Global Mangrove Distribution, Aboveground Biomass, and Canopy Height (ornl.gov)](https://daac.ornl.gov/CMS/guides/CMS_Global_Map_Mangrove_Canopy.html)
* [Why Mangroves? – Mangrove Science](https://mangrovescience.org/why-mangroves/)
* [Mangrove Reference Database and Herbarium (MRDH) - Search taxa (marinespecies.org)](https://www.marinespecies.org/mangroves/aphia.php?p=taxdetails&id=3#distributions)

Quantifying scattering characteristics of mangrove species from Optuna-based optimal machine learning classification using multi-scale feature selection and SAR image time series

[Mangrove canopy height globally related to precipitation, temperature and cyclone frequency | Nature Geoscience](https://www.nature.com/articles/s41561-018-0279-1)

Mangroves for carbon capture - GLAS data can be used to predict the canopy height which can be used to calculate biomass and further carbon capture based on the allometric equations + carbon conversion factor

Impact on Human Health

- [Data on hospital and ICU admission rates and current occupancy for COVID-19 (europa.eu)](https://www.ecdc.europa.eu/en/publications-data/download-data-hospital-and-icu-admission-rates-and-current-occupancy-covid-19)

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Use of Fossil Fuels

- Coal – MoC, GoI

Food