Predictive Risk Assessment for River Plastic Pollution (2015–2060)

Client:

Global Clean Rivers Initiative (GCRI) – a global NGO focused on combating river plastic pollution through policy - making, resource allocation, and community engagement.

Project Title:

Predictive Modelling and Visual Risk Intelligence Dashboard for River Plastic Waste (2015–2060)

Objective:

GCRI has commissioned your Data Science consulting firm to help them:

1. **Analyze historical plastic waste trends** in rivers globally (2015).
2. **Predict the future risk** of plastic waste in rivers (by 2060) using Machine Learning and Deep Learning models.
3. **Identify high-risk countries** and suggest targeted policy interventions.
4. **Develop an interactive dashboard** (Tableau/Power BI) for stakeholders to visualize risk trends and predictions.

Dataset Source: River Plastic Waste Risk Scenarios (2015 vs 2060)

Key Columns:

- Country
- Continent
- River Name
- River Length (km)
- Annual Plastic Waste (Tonnes)
- Population near River
- Urbanization Rate (%)
- Waste Management Quality (Score)
- Plastic Waste Mismanaged (%)
- Risk Index
- Projected Plastic Waste (2060)

Project Scope:

1. Data Understanding & Cleaning (Python / Pandas)

- Create consistent time-based records.
- Handle missing values, normalize columns, and categorize risk levels.
- Feature engineering: Waste per capita, risk density, etc.

2. Exploratory Data Analysis (EDA)

- Identify top 10 highest-risk rivers in 2015 and 2060.
- Compare continents' performance (worsening vs improving trends).
- Visual storytelling using Seaborn/Matplotlib.

3. Predictive Modelling (ML & DL)

- **Goal**: Predict 2060 Plastic Waste (Tonnes) based on 2015 data.
- Apply regression models: Linear Regression, Random Forest, XGBoost.
- Deploy a Deep Learning model (e.g., MLPRegressor using Keras/TensorFlow).
- Evaluate performance using MAE, RMSE, and R^2.

4. Risk Classification Model

- Convert Risk Index into categories (Low, Medium, High).
- Train classification models (Logistic Regression, SVM, Random Forest).
- Predict country-wise classification and accuracy.

5. Trend Forecasting (Optional Extension)

- Use Time-Series forecasting if multi-year data is engineered.
- Prophet or LSTM for multi-decade waste projection (optional but adds depth).

---

6. Dashboard Development (Tableau/Power BI)

Develop an **interactive executive dashboard** with:

- Filters by country, continent, and river name.
- Visual comparison: Plastic waste in 2015 vs 2060.
- Maps showing top polluted rivers.
- Prediction-based "future risk zones."
- Exportable insights for policymaker reports.

Deliverables:

1. Python notebooks (cleaning, EDA, ML/DL models).
2. Trained model files and prediction outputs.
3. Tableau/Power BI dashboard file.
4. Business Memo
5. LinkedIn Post
6. Testimonial Video (to be mailed on datascience@oesonlearning.com)

LinkedIn Project Posts for Reference

1. https://www.linkedin.com/posts/namratadutta03_stockanalysis-oesoninternship-dataanalysis-activity-7175003464878428160-Kkt2?utm_source=share&utm_medium=member_desktop&rcm=ACoAABrueEsBWe7Fe6k69yDIqFh-gvCSjkPwBvU

2. https://www.linkedin.com/posts/mike-barbiere-7989b51a0_dataanalysis-datavisualization-python-activity-7166874519750586368-nMnE?utm_source=share&utm_medium=member_desktop&rcm=ACoAABrueEsBWe7Fe6k69yDIqFh-gvCSjkPwBvU

LinkedIn Articles Posts for Reference

1. https://www.linkedin.com/pulse/become-data-engineer-2024-dulmi-sapna-sehani--zcilc/?trackingId=8EUGGPnVS2uFTfW7L1ptZw%3D%3D

2. https://www.linkedin.com/pulse/man-behind-computer-journey-through-cybersecurity-oeson-a-mewborn-l5p8e

3. https://www.linkedin.com/pulse/my-internship-experience-oeson-atakan-erdogan-tjbtf

Testimonial Video

https://www.linkedin.com/posts/oesonlearning_datascience-coursereview-studenttestimonial-activity-7307226678139719680-4QnM?utm_source=share&utm_medium=member_desktop&rcm=ACoAABrueEsBWe7Fe6k69yDIqFh-gvCSjkPwBvU