🌎 Final Summary: Deforestation Issue Analysis Using SVM

Objective:

To predict and analyze deforestation (Tree Cover Loss %) using Support Vector Machine (SVM), and identify the key factors driving forest loss across multiple countries.

🔍 Model Performance

Metric	Value
Mean Absolute Error (MAE)	**2.28%**
Mean Squared Error (MSE)	**6.37**
Root Mean Squared Error (RMSE)	**2.52%**
Model Type	**Support Vector Regression (Linear Kernel)**

Interpretation:
With an average error of **2.28%**, the model provides a **moderately accurate estimation** of tree cover loss, suitable for preliminary policy insights.

📊 Key Insights from Feature Analysis

Factor	Influence on Deforestation
Illegal Lumbering Incidents	**Strong Positive Impact** – More illegal activities lead to higher tree loss.
Corruption Index	**Positive Impact** – Corruption weakens enforcement, increasing deforestation.
Deforestation Policy Strictness	**Negative Impact** – Stricter policies reduce forest loss.
Agriculture Land Percent	**Positive Impact** – Agricultural expansion directly contributes to deforestation.
Protected Areas	**Negative Impact** – More protected zones lead to lower

Factor	Influence on Deforestation
Percent	deforestation rates.
CO2 Emissions, Population, GDP	Show indirect/mixed effects, depending on regional governance and development priorities.

💡 Final Recommendations

1. **Strengthen Forest Protection Policies**
    - Enforce strict regulations to curb illegal lumbering.
2. **Anti-Corruption Measures in Forestry Governance**
    - Target corruption hotspots to improve policy effectiveness.
3. **Expand Protected Areas**
    - Safeguard more forest zones to limit agricultural encroachment.
4. **Promote Sustainable Agriculture**
    - Balance food production with environmental conservation.
5. **Optimize International Aid Use**
    - Focus foreign aid on anti-deforestation programs and governance improvements.

🚀 Conclusion

- **Deforestation is driven by a mix of environmental, economic, and governance factors.**
- SVM has successfully identified **illegal lumbering, corruption, and agriculture expansion** as the top contributors to forest loss.
- Policy interventions focused on **protection, law enforcement, and sustainable land management** can significantly reduce deforestation.

🔮 Future Scope

- Apply **non-linear models (RBF SVM, Random Forests)** for better predictions.
- Use **time-series data** for forecasting future deforestation.
- Integrate **satellite imagery and spatial data** for deeper insights.