

# Green Cover Index (GCI) Prediction Models

## Linear Regression

### Purpose:

Linear Regression predicts a continuous target variable based on a linear relationship with one or more predictors.

### How it Works:

Fits a straight line through historical GCI vs Year data and uses the line to predict future GCI values.

### What it Predicts:

Forecasts GCI for the next decade (2025-2035) assuming an approximately linear trend.

## Support Vector Machine (SVM) Regression

### Purpose:

SVM regression captures non-linear trends in the data using kernel functions.

### How it Works:

Maps Year data into a higher-dimensional space, fits a function within a margin of error, minimizing prediction errors.

### What it Predicts:

Flexible GCI predictions capturing subtle non-linear patterns.

## Random Forest Regression

### Purpose:

Random Forest uses multiple decision trees to improve prediction accuracy and reduce overfitting.

### How it Works:

Trains multiple decision trees on subsets of data and averages their predictions.

### What it Predicts:

Robust GCI forecasts for irregular or noisy historical trends.

## Deep Learning Regression (Optional)

### Purpose:

Neural networks model highly complex, non-linear patterns.

### How it Works:

Feedforward neural network learns the relationship between Year and historical GCI through iterative optimization.

### What it Predicts:

GCI values accounting for complex trends; improves with more data and features.

Performance Metrics (Summary Table)

Model	R <sup>2</sup>	MAE	RMSE
Linear Regression	0.xxx	0.xxx	0.xxx
SVM Regression	0.xxx	0.xxx	0.xxx
Random Forest	0.xxx	0.xxx	0.xxx
Deep Learning (Optional)	0.xxx	0.xxx	0.xxx