

## Ethical Considerations in Applying Machine Learning to Climate Change Data

As machine learning becomes more widely applied to climate change data, organizations like ClimateWins must consider several ethical pitfalls. First, although most climate data is environmental, personal information may still be exposed when linked with regional behaviors or community-level data. For example, if certain energy usage patterns are tied to specific zip codes, this can risk re-identification of individuals or expose economically vulnerable areas.

Regional and cultural biases also present a risk. Climate change impacts vary significantly across geographies, and training data may underrepresent rural or developing areas. If machine learning models are primarily trained on data from Western Europe, they may not make accurate predictions for Eastern Europe or Northern Africa. This can exacerbate inequality in disaster preparedness and policy planning.

Human biases in interpreting climate data can also be embedded during model training. For instance, if historical data reflects underreporting in certain regions due to lack of sensors or political interests, ML models could inherit these blind spots and reinforce existing inequalities.

Lastly, if predictions from ML models are used to direct resources, incorrect forecasts could cause harm by redirecting funding or services away from high-risk areas. ClimateWins must validate models rigorously and consider transparency, inclusiveness, and fairness at every stage of development.