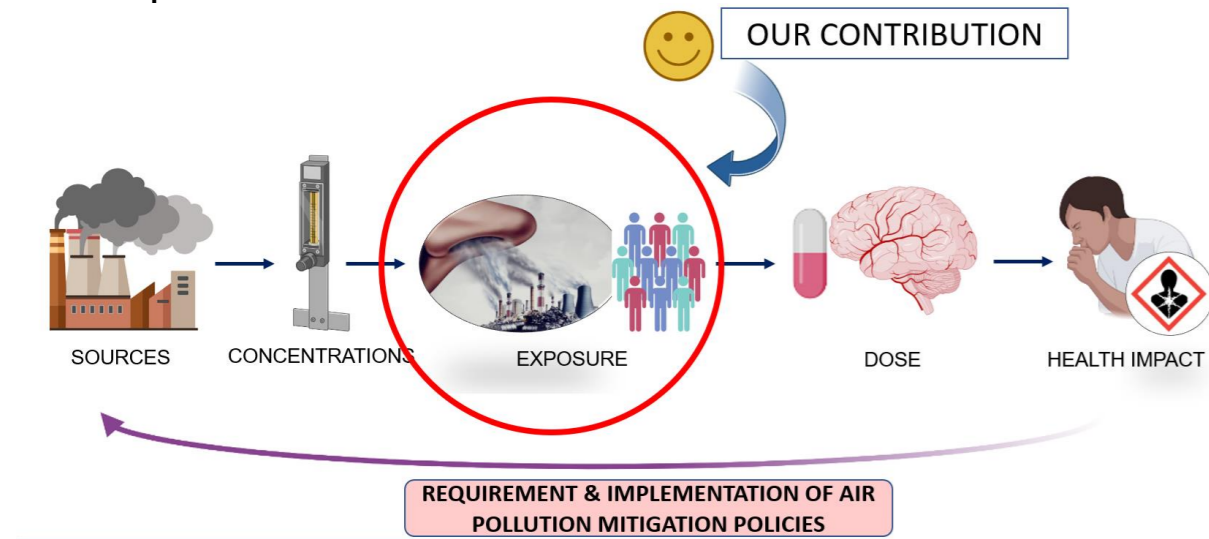


National Scale NO₂ Exposure Assessment in India using Satellite Based Land Use Regression Model

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Background:

Globally 6.67 million deaths (12% of total) were attributable due to air pollution – SOGA 2020

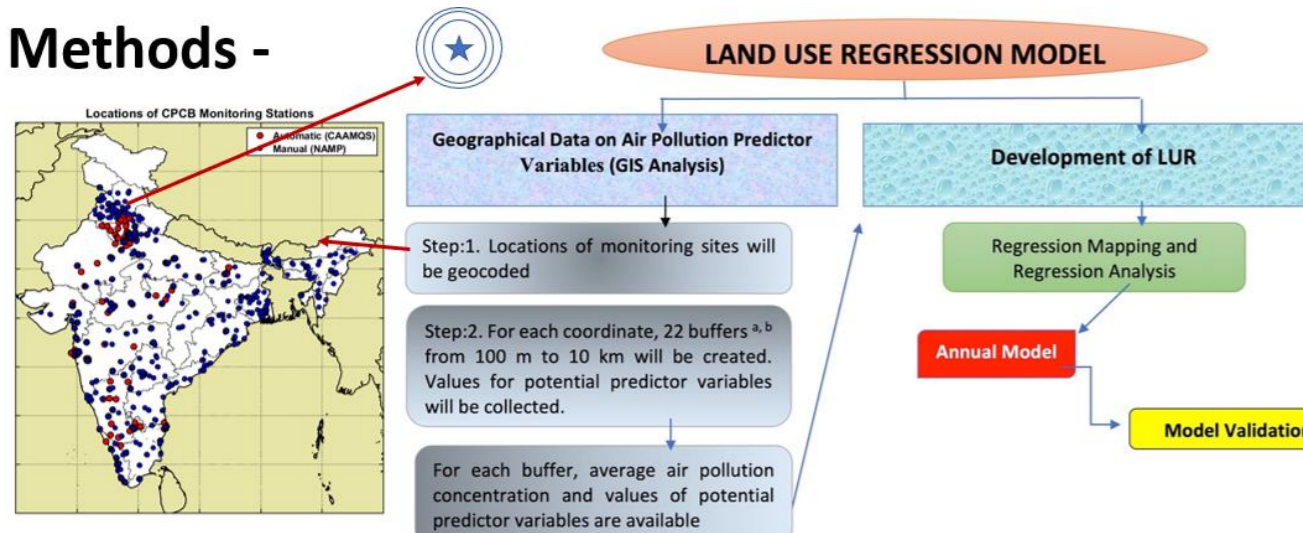


ENVIRONMENTAL HEALTH PATHWAY

Study Objective:

To develop exposure model for nitrogen dioxide using satellite based land use regression model for India

Methods -



Modelling Approach: Model Types - (1) Automatic Monitoring Stations only; (2) Both Automatic and Manual Monitoring Stations

Model Fitting :

- We used total 270 predictor variables for model fitting and out of which final model has chosen 4 variables
 - OMI NO₂
 - Population Density (7000 m buffer)
 - Tree Cover (10,000 m buffer)
 - Vegetation Cover (2000m buffer)
- Supervised forwards additional linear regression method was used for model fitting

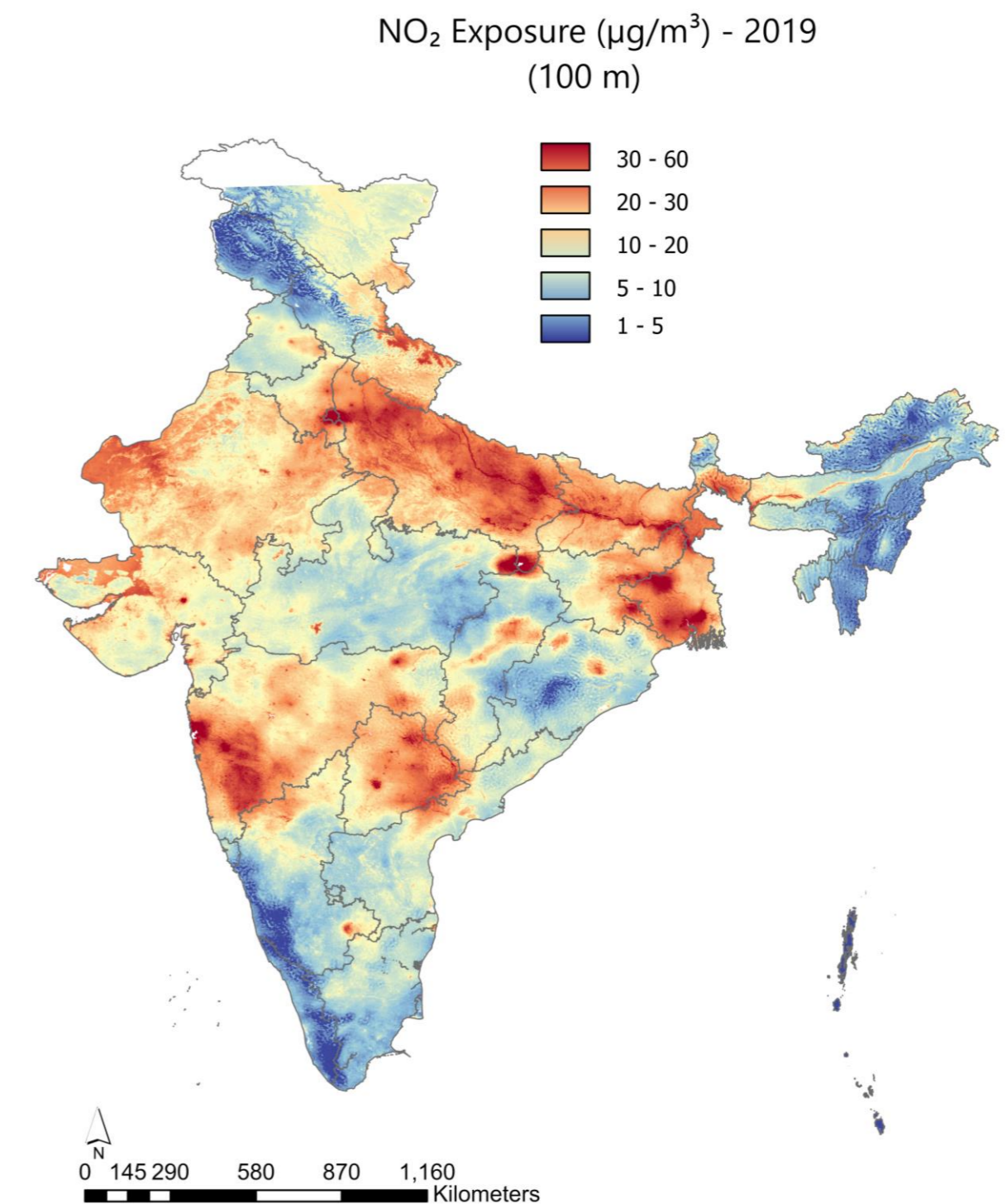
Cross Validation : 10 fold cross validation was used to calculate a spatial R² for Each of the fitted Model

~93% Indian Population is Exposed to NO₂ Levels Greater Than WHO Safe Limits (10 µg/m³)



Results

Model Fit	Number of Monitors	Moran's I (p value)	R ²	Model R ²	Model RMSE
Automatic Only	145	0.411	0.601	0.593	9.39
Automatic & Manual Both	729	<0.001	0.73	0.696	7.16



Conclusions

- Our best model was able to predict 73.1% variability in NO₂
- This very high spatial scale NO₂ exposure dataset (2015 - 2021) will be very helpful in terms of further air pollution epidemiological studies which are very critical when more than 90% population is exposed to such high NO₂ levels.

References

Knibbs, Luke D., et al. "A national satellite-based land-use regression model for air pollution exposure assessment in Australia." *Environmental research* 135 (2014): 204-211..