Phase 1: Problem Definition and Design Thinking

The scope of this document is to analysis air pollution in Tamil Nadu, to monitor station in Tamil Nadu and to control pollutions in high pollution areas.
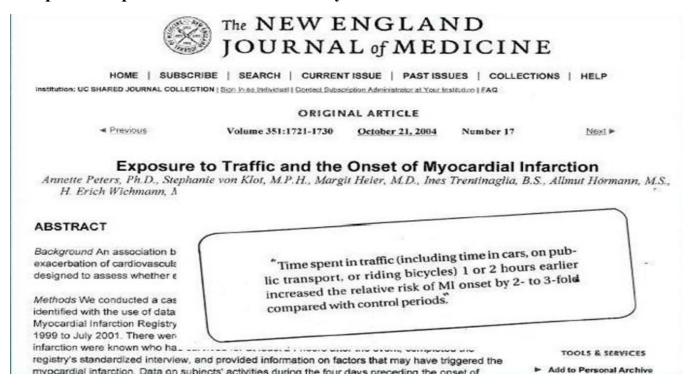
Problem Definition:

The objective of this project is to analyse and visualize air quality data from various monitoring stations in Tamil Nadu. The project aims to gain insights into the air pollution trends, identify areas with high pollution levels, and create a predictive model to estimate RSPM/PM10 levels based on SO2 and NO2 levels.

Why air quality data analysis?

- The analysis of air quality data can provide important insights into the formation and transport of air pollution
- Air Quality
  - Affects public health
  - Can damage plants and ecosystems (e.g., acid rain)
  - Causes deterioration of buildings, monuments, etc.
  - Contributes to climate change

Sample of air pollution health effect study:

Outline and Key Points:

- **Motivation**
  - The purpose is to understand the Tamil Nadu air pollution & answer questions
- **Conceptual model**
  - Understand the data –put a study in context
- **Available data ,tools and resources**

- o Air quality measurements and estimates of emissions
- o Models, techniques ,more examples

Design and Thinking:

1. Develop a conceptual description of the problem to be addressed

2. Develop a modeling/analysis protocol (a plan)

3. Select an appropriate model

4. Select appropriate meteorological time periods to model

5. Choose an appropriate geographic area to model, with appropriate horizontal/vertical resolution, and establish the initial and boundary conditions that are suitable for the application

6. Generate meteorological inputs to the air quality model

7. Generate emissions inputs to the air quality model

8. Run the air quality model with initial year (base case) emissions and evaluate model performance. Perform diagnostic tests to improve the model, as needed.

9. Perform future year modeling, including additional control strategies if needed to meet air quality standards

10. Perform supplemental analysis consider the weight of evidence to confirm the modeled

Conceptual Model is First Step

> Develop a conceptual description of the problem to be addressed
> - o We must understand something about the data you are analysing
> - o Formulate relevant science and policy question

Conceptual Model:

> A conceptual model is summary or what we know and don't know about the system we want to study
> A conceptual model includes a statement of relevant questions we want to answer

Who/what /where/when/why/how?

> Who or what causes air pollution?
> Where and when is air pollution a problem?
> For whom is it a problem?
> Why does air quality get better or worse?
> What is good air quality? What's our goal?
> How do we measure progress in solving air pollution problem?
> What don't we know about air pollution?

Conclusion:

Examples of Data Analysis Of Air pollution in Tamil Nadu (Madurai)

Year	Annual Average Concentration of Air Pollutant,µg/m³			
Ambient Air Quality Monitoring Results of Madurai Between 2003 & 2012				
C. Location: Highway Project Building ,Madurai				
Category-Residentiakl Area				
	TSPM	**RSPM**	**NO$_x$**	**SO$_2$**
2003-2004	135	60	25	8
2004-2005	109	51	20	9
2005-2006	110	37	27	9
2006-2007	98	37	23	9
2008-2009	84	41	24	10
2009-2010	97	46	25	10
2010-2011	101	47	24	11
2011-2012	NA	47	24	10
Prescribed Standard				
Industrial	360	120	80	80
Residential,Rural & Other Areas (Mixed)	140	60	60	60
NAAQS-2009	NA	60	40	50

Chart Analysis of the Data given:

Graph showing Ambient Air Quality in Madurai between 2003-2012