Madhya Pradesh Pollution Control Board

Environment Surveillance Centre

Paryawaran Parisar, E-5, Arera Colony, Bhopal -462 016 (M.P.)

Ph : 0755-2469180, **E-mail** : ercmppcb@nic.in **Web** : www.erc.mp.gov.in

No. 59 /HOPCB/ERC/2024 Bhopal, Dt: 24/05/2024

The Regional Officer
M.P. Pollution Control Board
Bhopal/Indore/Gwalior/Jabalpur/Mandideep/
Rewa/Sagar/Chhindwara/Singrauli/Satna/ Shahdol
Guna/Katni/ Pithampur/Ujjain

Sub: Feedback on UNEP Proposal on Decision Support System for Air Quality Management in Madhya Pradesh State.

Ref. : Meeting held with UNEP Officials at New Delhi on 15/09/2024.

The UNEP-India has submitted a proposal aimed to develop a State-wide decision support system for air quality management in Madhya Pradesh State. This encompasses various modules, including emission inventories, source apportionment, forecasting, scenario analysis, cost-benefit analysis and a user interface. The digitized emission inventories are proposed to be developed at $10x10^2$ km resolution based on the inputs provided by the State authorities.Online repository shall be used for sectoral activity data. A total duration of 36 months is envisaged for this multi-departmental project with an estimated budget of ₹ 8.24 Crores.

In the light of above your feedback on need and viability of project is valuable in shaping the direction and decide further course of action in the matter. It is urged to go through the attached project proposal and provide inputs based on our priorities and need, within two weeks time, to help us decide further course of action. A timely response is thankfully anticipated.

Encl. : A/a.

(A.A. Mishra)
Member Secretary

No. /HOPCB/ERC/2024 Bhopal, Dt: / /2024

Copy to :

1. Shri H.K. Sharma, Director (Tech.), M.P. Pollution Control Board, Bhopal for opinion and necessary inputs on UNEP's project proposal.

(A.A. Mishra)
Member Secretary

UNEP Proposal

on

Developing state-wide decision support system, plan and capacities for air quality management in Madhya Pradesh

1. Background

Air quality is a major concern in India with 132 non-attainment cities, not meeting the prescribed national ambient air quality standards, among the cities that monitored air quality in 2017. Figure 1 shows the state of air quality at different monitoring stations in Indian cities during 2021 based on the national ambient air quality monitoring network. The ratios of annual average pollutant concentrations with respect to national annual ambient air quality standards at different stations shows severe violation of PM_{10} standards at several locations, and NO_Xstandards in some. SO_2 concentrations are within the limits except few stations, which show violations.

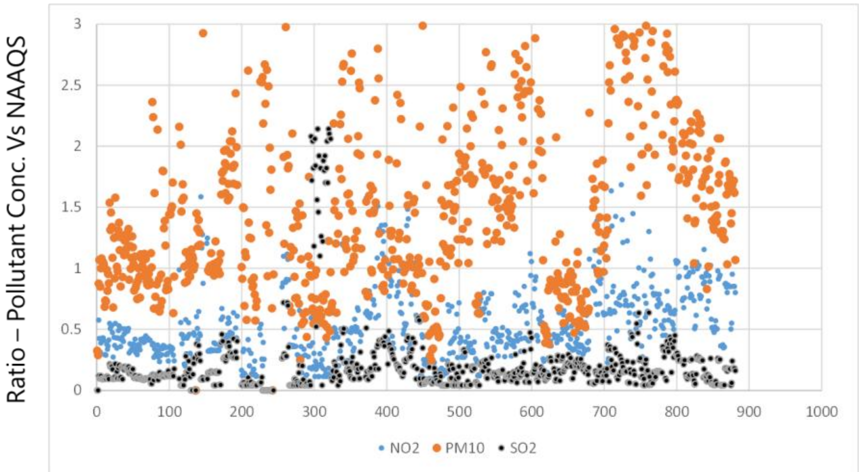

Figure 1. Status of air quality at various monitoring stations in Indian cities in 2021 (ratio of annual average pollutant concentrations with respect to national annual ambient air quality standards). Each dot in the chart represents the ratio at a monitoring station in India.

High air pollution levels lead to a variety of impacts on human health, agriculture, buildings, ecosystems, climate, and economy. It is critical for the policy makers, researchers, and other stakeholders to assess thepresent situation and scenario, future economic growth prospects,and their implications tomitigate and avert any potential threats to the air quality of the regions. While the National Clean Air Programme (NCAP) defines target of reducing particulate matter (PM) concentrations by 40% in 2026 compared to the levels in 2017, the optimal pathways to reach this have not been defined and assessed. There is a need to develop state-level action plans and decision support systems to strengthen capacities for air quality management in India. Several states in the country havea huge population base, widespread and growing economic activities, and many air quality non-attainment cities. Madhya Pradesh is one of them, with severalalready identified non-attainment cities in terms of air quality normsfor PM.

2. Study domain: Madhya Pradesh

Madhya Pradesh is the second largest state in the mid of the country with an area of 3, 08, 000 km2 (Figure 2). It is a part of peninsular plateau whose boundaries touch the Indo-Gangeticplains in the north, Aravalis in the west, Chhattisgarh plains in the east and the Tapti valley in south. The topography of Madhya Pradesh is defined by the Narmada and Sone Valleys. Bhopal, the capital, is situated at the eastern edge of the Malwa plateau in the state. The highest peak of the staterises to about 1360 m above sea level. Climatically, Madhya Pradesh has three major seasons – Summer, Monsoon and Winter. Temperature during summers ranges above 29.4°C, with eastern parts hotter than the western parts. The humidity is relatively very low and there are frequent mild dust storms. The south-west Monsoon usually breaks out between June and September. The south and south-east regions tend to experience a higher rainfall in comparison to north-west. Temperature remains low in the northern parts of the state in comparison to the southern parts. Maximum temperature in north MP remains at 15-18°C during January.

Madhya Pradeshhas an agricultural and pastoral economy, with wheat, soybean and jowar paddy and millets being the main crops. Industrial development is primarily concentrated in some districts like Indore, Bhopal, Gwalior, and Jabalpur.The state is the second richest state in India in terms of its mineral resources with big reserves of Manganese, about 45% of Bauxite found in India, Iron ore deposits, and rich reserves of coal.Madhya Pradesh is also a tourist attraction with monuments of historical, archaeological, architectural and pilgrimage importance.

Over 30% of the State's total area is covered byforest with eastern districts having moreforest density. Major rivers of the state are Narmada, Chambal, Tapti, Betwa, Sone, Shipra, Kali Sindh and Tava. Besides Thermal and Hydro power generation, the state has numerous power projects.

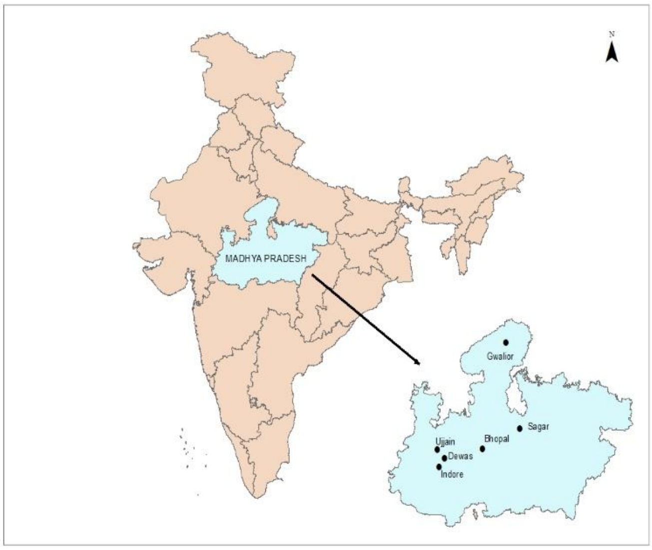

Figure 2. Study domain.

3. Air quality in Madhya Pradesh

Madhya Pradesh is one of the states in the country with identified non-attainment cities (9:Dewas, Nagda, Ujjain, Gwalior, Jabalpur, Bhopal, Indore, Sagar, and Satna). Annual average concentrations of PM in various cities in 2021 show violations of ambient air quality standards (Figure 3). The ratio of $PM_{2.5}$ to $PM_{10}$is generally lower than 0.5 depicting higher presence of coarse particles in the PM_{10}concentration levels, which can be attributable to crustal and other anthropogenic dusty sources. $PM_{2.5}$ levels are above the standards in many cities and need proactive controls.

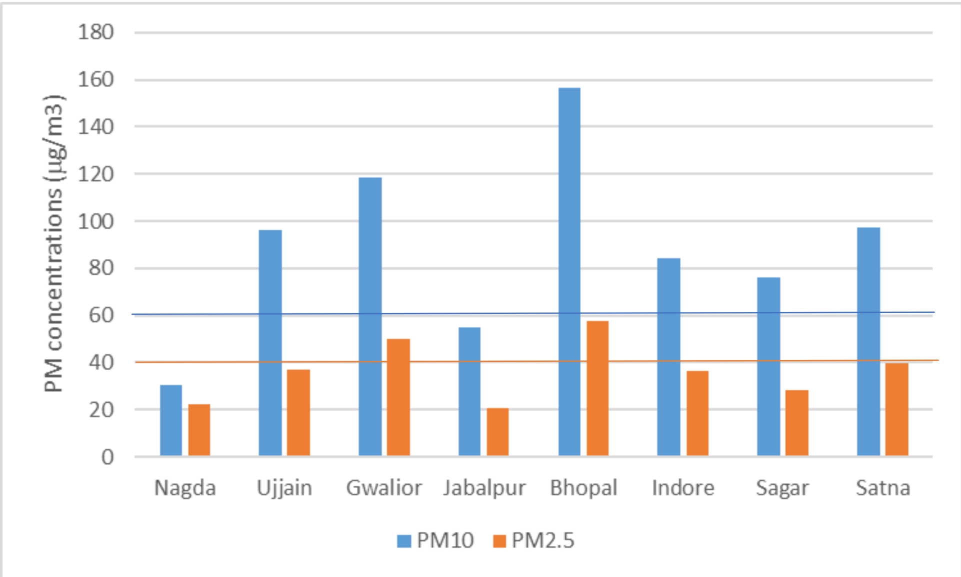

Figure 3. Annual average concentrations of PM in various cities in Madhya Pradesh during 2021.

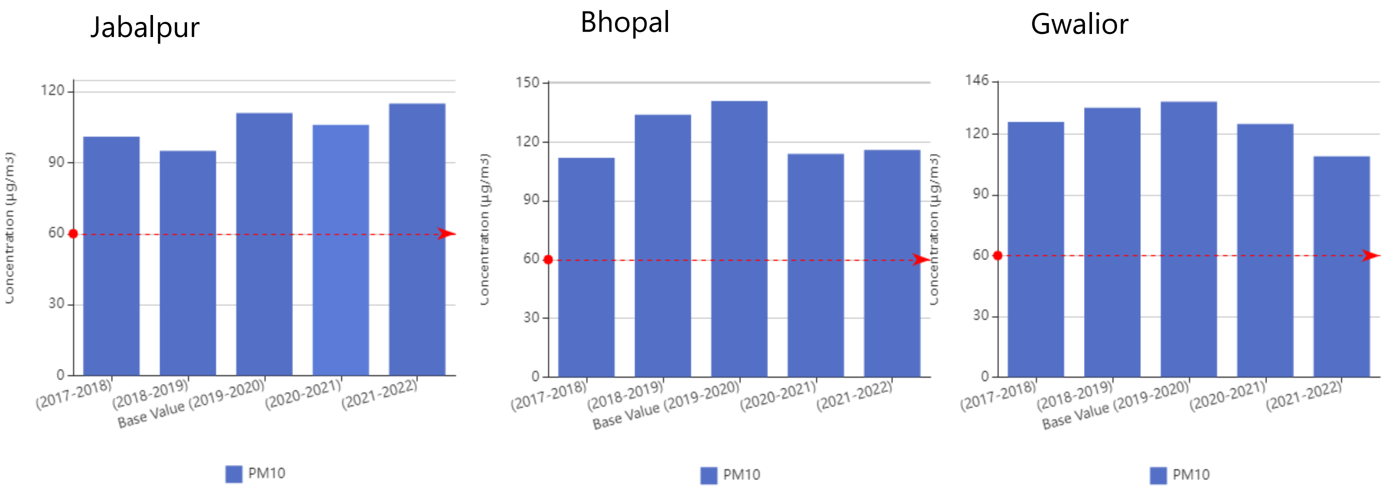

Figure 4.Changes in annual average PM_{10} concentrations in different cities of Madhya Pradesh.

Data source: Prana Portal.

Figure 4 shows the changesof annual average PM_{10} concentrations in different cities of Madhya Pradesh. The changesare broadly inconclusive in terms of trends and show that significant efforts are required to reduce pollutant concentrations in the state. Figure 5 shows the month-wise (seasonal) variation of PM_{10} and $PM_{2.5}$concentrations in one of the cities (Jabalpur) of Madhya Pradesh, indicating severe violation of air quality standards especially during the winter season.

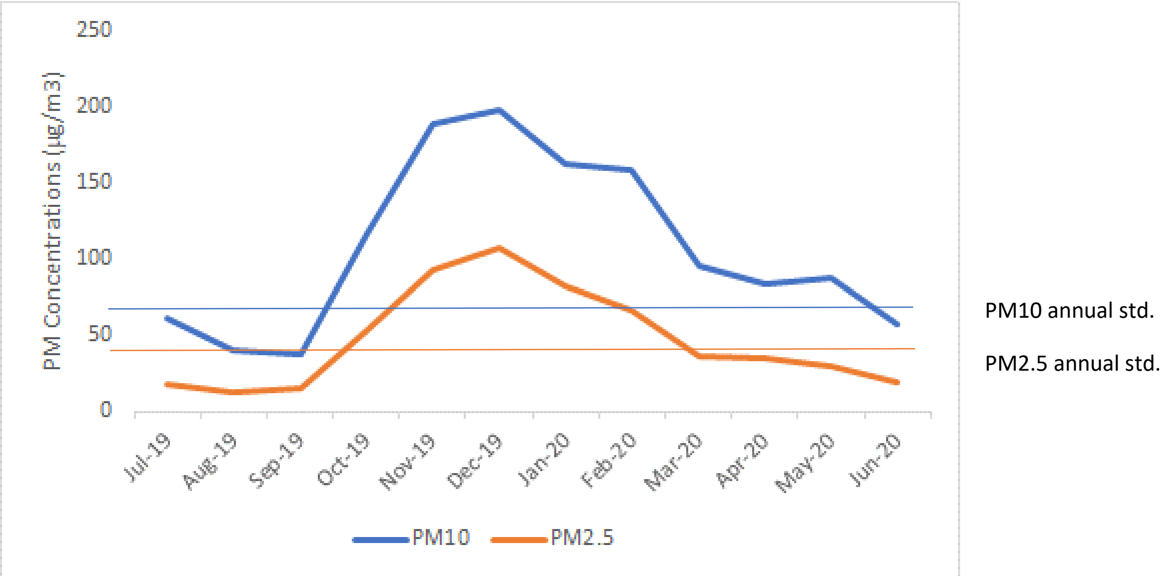

Figure 5. Month-wise (seasonal) variation of PM concentrations in Jabalpur city of Madhya Pradesh.

Data source: https://cpcb.nic.in/Actionplan/Jabalpur.pdf

Evidently, there is a clear need to manage air quality through scientific and cost-effective ways. There are several efforts made by the Government of Madhya Pradesh for improvement of air quality in various cities of the state. City level action plans have been developed for various non-attainment cities and various sources (vehicles, thermal power plants and ash ponds, industries, brick kilns, road dust, waste burning, construction dust, residential biomass burning, agricultural burning, and mining) have been identified for control. Source apportionment studies for various cities are also in progress which can further help in strengthening of action plans.

4. Need for a state-level decision support system

While there are currently various city level initiatives and management plans being preparedor implemented for various urban centres of the states, they will beinsufficient to achieve national air quality standards, WHO interim targets and guidelines. This is because other than the local sources present in cities, regional scale pollution caused by sources outside of cities also contribute significantly to the non-attainment status of many cities in the states. More importantly, the decision-making authority lies at the state government level for

Why is astate-level decision support system required?

- Regional pollution (primary and secondary) remains unaddressed with city-based approach.
- Absence of comprehensive integrated regional-urban scale air quality management and planning.
- Limited mechanism to individual cities to estimate the emission reduction caused by various measures.
- Absence of cost-effectiveness analysis to prioritise strategies to achieve air quality objectives faster and at lowest costs.
- Absence of future air quality projection and forecasting of air pollution episodes.
- Absence of a tool to assess air quality situation and take targeted, impactful actions.
- Limited capacities and awareness levels among various stakeholders.

many important sectors such as transport, industries, power, residential, etc. The National Clean Air Programme (NCAP) of India also recognises the need for comprehensive regional plans for more effective air quality management incorporating the inputs from the regional source apportionment studies.

There is presently very limited decision and management support in place for regional or state-wide air pollution control in India. State-level air quality management plans are important to guide the state-level agencies to take actions for effective air pollution control across the state. Such support maynot only contribute towards air quality improvement across the whole state (including cities) but could also help the government to plan and strategize socio-economic activities with due consideration to maintain good air quality across the state.

Also, as there are multiple sources of air pollution and the actions required to be taken on the ground fall in the domain of several state, district, and city level authorities. Evidently, capacities need to be built across the board to ensure effective contributions from different departments towards a common goal of improved air quality. In addition, multi-departmental capacities are also required to be built for providing regular inputs for dynamic updation of emission inventories to assess the air quality scenario and plan for future control strategies. This need has also been clearly highlighted in the Needs Assessment Report developed through wide stakeholder consultations held by UNEP through its Air Quality Action Forum (AQAF) initiative.

With state-wide air quality management plans, and decision support systemsin place,coupled with human capacities being built around them, the rapidly growing statesin India,like Madhya Pradesh can benefit immensely and fulfil the objectives of NCAP. The benefits of a decision support system are also presented below in Figure 6.

Figure 6.Benefits of a decision support system.

5. Objectives

UNEP proposesdevelopment of an air qualityDecision SupportSystem (DSS), and a state-level air quality management plan andbuildingmulti-sectoral capacities for effective air pollution control in the state of Madhya Pradesh. The major objectives of this project are:

a) Develop a DSS for supporting implementation of actions to reduce air pollution across the state including both urban and rural regions, to improve human health, agricultural productivity, and economy.

b) Develop state-level action plan to supplement actions taken at the city level and help cities in the state to move away from the air quality non-attainment status.

c) Assist the government in using a purposeful framework and DSS to plan and strategize socio-economic activities with due consideration to maintain good air quality across the state.

6. Plan and methodology

The broad project plan is explained in Figure 7, which includes development of an IT based state-wide air quality management DSS for the state of Madhya Pradesh using state-of-the-art air quality modelling techniques. DSS will consist of the following 6 modules:

1) Emission inventories dynamically updated
2) Source apportionment
3) Forecasting
4) Scenario analysis and intervention testing
5) Cost-benefit analysis and prioritisation
6) User interface

The DSS will allow development of a state level air quality management plan. It will also be used for capacity building and for generation of awareness resources such as automated reports accessible through the userinterface.

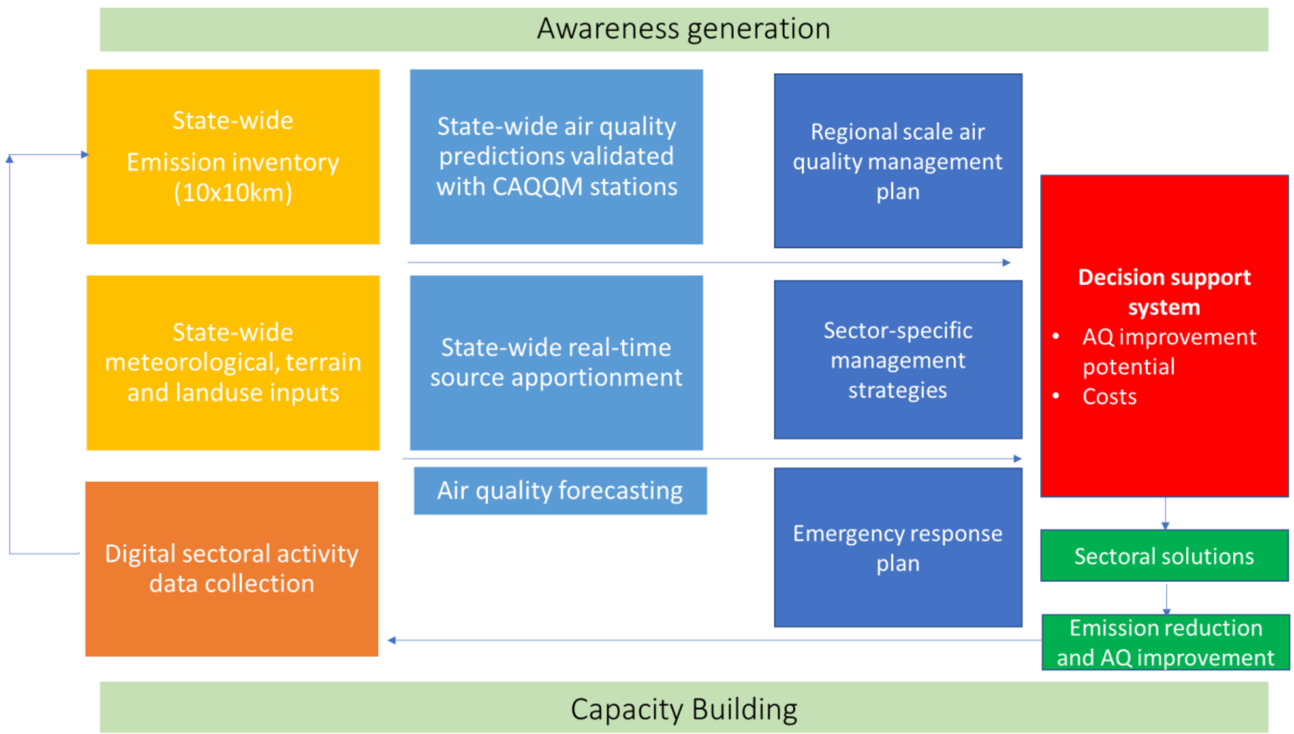

Figure 7.Proposed development for state-wide air quality management decision support system and associated capacities.

The DSS would use emission inventories and chemical transport models to provide information on state of air quality ($PM_{2.5}$ and other important pollutants like PM_{10}, SO_2, NO_X, O_3 etc) in different parts of the state. Moreover, the system would provide source apportionment results for $PM_{2.5}$

concentrations in various parts of the state. It would provide predicted and validated air pollutant concentrations, source apportionment results, and costs of control measures, and enable the policy makers to make informed policy decisions. The IT-based user-interface in DSS would be developed to link the scientific models in the back end, with simple understandable outputs. The DSS would allow the policy makers to identify most effective and optimised strategies for air pollution control at state and city levels. The DSS would also build capabilities for projections and scenario analysis for future air quality. The DSS will also include a forecasting sub-system, in which short term (5-day) air quality forecasts can be developed based on meteorological forecasts. A DSS using forecasts has been developed for Delhi NCR to assist the Commission for Air Quality Management (CAQM) to take informed decisions for air quality improvements.

The following broad activities are proposed to be carried out:

6.1 Emissions inventorisation

Digitised emission inventories will be developed at 10x10 km^2 resolution collaboratively based on digitised inputs provided by state and district level authorities for different sectors. Satellite based inputs can also be sought for specific sectors like agricultural and forests burning. Activity data would be required to be updated by state/district levels at the least on yearly basis, which would be flagged by the proposed system at due frequencies.

Standardized emission modelling methodologies will be employed for estimation of emissions based on energy and non-energy sources. The model will consider various sector-fuel combinations to estimate emissions using the basic approach:

Emissions = Activity level *Abated emission factor * % of capacity controlled

where,

Abated emission factor = Unabated emission factor * (1 - % removal efficiency of the control strategy)

The various fuels / energy sources which will be considered are: (i) coal, (ii) natural gas, (iii) petroleum products, (iv) biomass fuels, and others. Emission inventorisation will be carried out for all the major sources existing in the state including domestic, industries, transport, power plant, road dust, DG sets, construction, agricultural residue burning, refuse burning, etc. Based on the activity data inputs, emissions will be estimated for nitrogen oxides (NO_X), sulphur dioxide (SO_2), carbon monoxide (CO) and particulate matter (PM_{10} and $PM_{2.5}$), and non-methane volatile organic compounds (NMVOCs).

The emission inventory will be spatially and temporally distributed for the study domain. As far as possible, India specific data on emission factors, fuel quality standard and deployment of tail pipe control technologies will be used, whenever possible.

The dynamic emission inventory updating will require:

a) developing simple templates for regular collection of activity data from different sectors.
b) discussing and refining data templates with different government departments.
c) linking finalised data templates with online repository at a nodal department (State Pollution Control Board).
d) developing an online database of sector-wise emission factors
e) developing a sector-wise emission inventory calculation model linking the online repository of activity data and emission factors database.

The sector-wise emission inventory calculation model will take inputs from the online repository of sectoral activity and emission factor at regular intervals and keep on updating the emission inventory of the region (Figure 8).

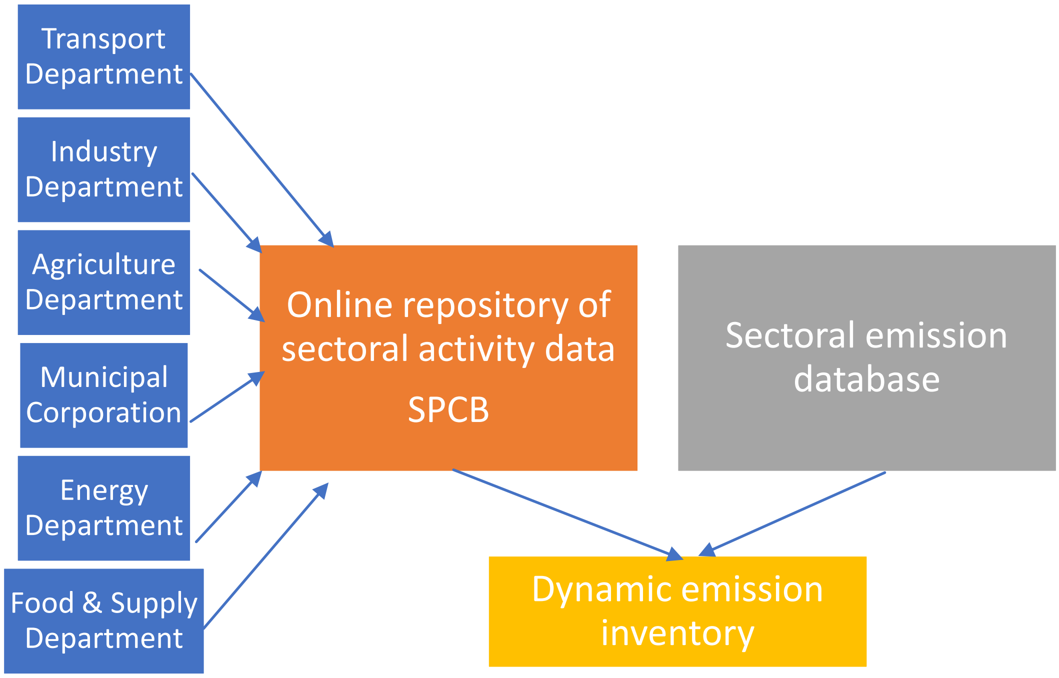

Figure 8. Dataflows for dynamic emission inventorisation in Madhya Pradesh.

6.2 Source apportionment

Emission inventories developed in previous step will be fed into the air quality model along with meteorological model datato model air pollutant concentrations in the state. After model validation, source contributions will be estimated to prevailing pollutant concentrations using source-sensitivity approach.

6.2.1 Meteorological modelling

Meteorology has an important role to play in dispersion and transport of pollutants. The meteorological fields developed for the study domain act as an important input to the air quality simulation model to assess the transport and dispersion of pollutants. The WRF model is a next-generation meso-scale numerical weather prediction system designed to serve both operational forecasting and atmospheric dispersionneeds. It features multiple dynamical cores, a 3-dimensional variational (3D-VAR) data assimilation system and a software architecture allowing for computational parallelism and system extensibility. WRF is suitable for a variety of applications across scales ranging from meters to thousands of kilometres. It also provides operational forecasting, a model that is flexible and efficient computationally. The WRF model will be used to generate meteorological fields over the study domain as input to running the air quality model at subsequent stage.

6.2.2 Air quality modelling

Air quality modelling will be carried out using one of the established chemical transport models (CTMs) (e.g.,Community Multi-scale Air Quality model (CMAQ), or WRFCHEM)which are the latest air quality modelling and assessment tools designed to support air quality modelling applications ranging from regulatory issues to science inquiries on atmospheric processes. The CTMs can address PM, tropospheric ozone, acid deposition and other air pollutant issues in the context of "one" atmosphere perspective where complex interactions occur between atmospheric pollutants and regional and urban scales.

This CTM used in DSS willrequire input data related to emissions, meteorology and terrain for the selected domain. These inputs will be obtained from results of emission estimation and meteorological models from the previous steps. Thereafter,several processes will be run for carrying out the simulation of air quality.The flow of various modelling processes to be followed are shown in Figure 9.

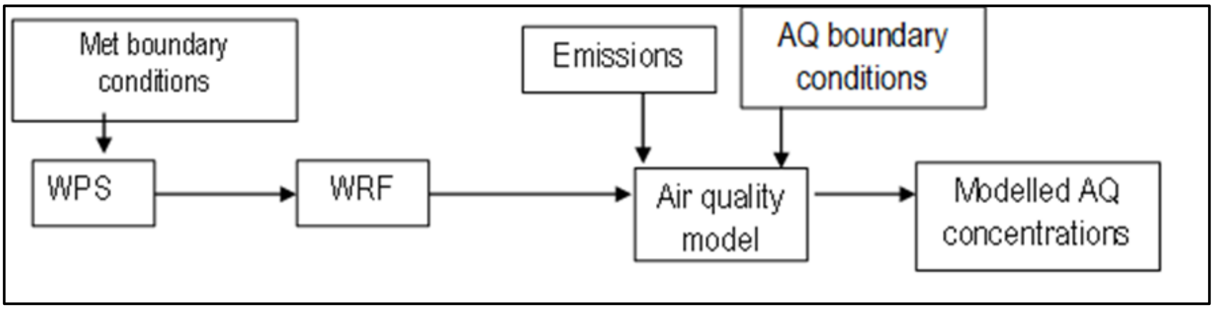

Figure 9. Air quality modelling processes for the DSS.

The output of the air quality modelling will be in form of pollutant concentrations at different spatial and temporal scales across state. The modelled concentration will be validated against the observations gathered through various real-time and manual monitoring stations across different cities in the state. The validated model will then be used for carrying out source apportionment for the important categories of sources using the source sensitivity method. The model will also be used to establish source-receptor relationships between the different 52 districts in the state to estimate geographical contributions to pollutant concentrations in the various districts of the state.

6.3 Air quality forecasting

A specific module on air quality forecasting will be developed using a combination of machine learning and chemical transport modelling techniques. 5-day air quality forecasts will be developed for state. The CTM will be used to train a machine learning model to develop less computationally intensive air quality forecasts, specifically for various air quality monitoring locations(with sufficient past datasets for training the model).

Air quality forecasts can be used to take immediate actions to avert likely health impacts due to a high air pollution episode. Based on these, emergency response plan/graded response plans can be implemented for specific cities to take specific actions in varying air pollution conditions.

6.4 Scenario analysis and intervention testing

The validated model will be used for future scenario building and air quality projections under different scenarios. The scenario analysis and intervention analysis module of the DSS will provide functionality to the users for testing different 1) sectoral future growth scenarios, and 2) sectoral emission control interventions, to assess their impact on air pollutant emissions and ambient concentrations in the state.

The model system will be used to identify and include the possible strategies that can be used for air pollution control in different parts of the state. These strategies will provide the user witha prioritised list of actions (in terms of their potential for reducing PM pollution) for air quality improvement in different parts of the state.

6.5 Cost-effectiveness analysis and prioritisation

Decisions for air pollution control and management are based on emission reduction potential of different strategies, ease of implementation, and costs. A comprehensive economic analysisof different possible air pollution control interventions will be carried out to assess their cost effectiveness in reducing emissions and improving air quality in Madhya Pradesh. This will help the policy makers to take informed decisions in future investments in air quality management.

Cost effectiveness analysis will be carried out based on a variety of parameters including resource/fuel consumption, costs of proposed interventions and the consequent costs over a period. This will be carried out independently for various sectors contributing to emissions. Different costs associated with interventions (capital costs and/or costs associated with technology/process upgradation or switching, operational costs) and benefits (e.g., improved efficiency), will be accounted and estimated based on information from literature, stakeholder consultation, and technology providers. Cost analysis over the lifetime of the strategy will be carried out to provide estimates. These will be used to develop a prioritised list of strategy options based on cost effectiveness which in the case of $PM_{2.5}$ is the ratio of costs incurred per unit of $PM_{2.5}$ concentrations reduced in a particular region.

6.6 Development of a user-interface

An IT-based user interface to the technical modules will be developedforproviding most simplified information to the users (particularly the policy and decision makers in the state) for effective decisionmaking. The user interface will:

a) Present (daily, seasonal, and annual) air pollutant emissions and concentrations in different parts of the state
b) Present (daily, seasonal, and annual) source apportionment of air pollutant emissions and concentrations in different parts of the state
c) Present (daily, seasonal, and annual) geographical contributions to air pollutant concentrations in different parts of the state
d) Present list of strategies for control of pollution based on potential of reduction and cost-effectiveness
e) Present 5-day forecasts of air pollutant concentrations in different parts of the state
f) Present future projections of air quality in a standard business as usual, and ambitious scenario
g) Allow users to carry out interventions testing and assess impact of different interventions on air quality in different regions of the state
h) Allow users to run economic growth and emission control future scenarios,andassess their impact on air quality in different regions of the state

6.7 State level air quality management and emergency management plan

The decision support system, once fully implemented, will be used for development of a state level air quality management plan for Madya Pradesh. Based on assessment of air quality, present emissions,and future emission projections, as well asair pollutant concentrations, and future scenario analysis (for next 5-10 years), a draft state level air quality management plan will be prepared in consultation with the Government of Madhya Pradesh. This wouldensure air quality improvement in both rural and urban regions and will help the cities to move towards the attainment status in terms of air quality standards. This plan would also consider the costs of implementation and the impact of different strategies for control of pollution. This will include clearly identified regional and state-wide strategies based on theassessments carried out using DSS. The plan will also include budgetary estimation for various strategies, define timelines for implementation, and identify responsible agencies for execution of activities.

The project team will also develop an emergency plan for management of high air pollution episodes based on forecasted air quality alerts.

6.8 Building capacities of planning, regulatory and implementing agencies

It is proposed to launch a Multi-sectoral Capacity Augmentation Programme on Air Quality Management (MCAP-AQM) in Madhya Pradesh. The objectives of MCAP-AQM are the following:

I. Strengthen capacities of state Department of Environment(DoE)/Pollution Control Board on air quality assessments, monitoring and data analysis, air quality management, planning, implementation, and enforcement.

II. Build capacities of the line departments (ULBs, Transport, Industries, Agricultural etc), at districts/state and city levels on specific role of various departments, actions to be taken and strategies for implementation of actions for air quality improvement.

III. Build capacity of the health department to assess, develop and implement health driven action to combat air pollution.

It is proposed to compile the existing and develop new and relevant course modules to carry out MCAP-AQM across the state. The project team may carry out 10-day trainings for various listed departments for 10 cities across the state. The cities which have shown high levels of pollution can be selected under this programme for building capacities across different departments. The key departments at state/district/city levels, relevant sectors they are handling, and the proposed areas of capacity building are stated in the Table 1 below.

Table 1. Proposed areas of capacity building for different departments.

S.No	Departments	Sectors	Key areas of capacity building	Time
1	Urban local bodies Urban development department	General Waste Roads Construction	• Decision support system use to tap and use Finance Commission grants effectively. • Waste management (opportunities for ULBs for sustainable waste management). • Vigilance, control and enforcement of refuse burning. • Methods to measure, and solutions to reduce road dust. • Construction dust management, dust monitoring and enforcement.	3 days
2	Transport department	Vehicles	• Strategies to reduce vehicular emissions in cities. o Public transportation o Traffic and congestion management o PUC o Old vehicles scrappage and retrofitment	1 day

			○ Electric vehicles ○ Others (e.g. congestion pricing)	
3	DoE/SPCBS/PCCs	R&D Industries	• Monitoring, modelling, source apportionment, and air quality management. • Optimization and enhancing air quality monitoring. • Industrial pollution control- (MSMEs, Brick kiln). • Enhancing technology assisted monitoring and enforcement in industries. • Emission trading scheme.	3 days
4	Agricultural department	Agricultural residue burning	• Strategies for in-situ and ex-situ management of agricultural residue • Techniques for detection and management of agricultural fires	1 day
5	Industrial department	Industries	• Best low emissions available technologies for industries • Financial models for industrial transformations	1 day
6	Health	Health	• Exposure mapping and control • Development and implementation of district health action plan	1 day

Building capacities are key to achieve adequate district and state level capacities to provide inputs for dynamic updation of emission inventories. Capacities willalso be built at the state level to run the user-interface of DSS and provide regular inputs to the highest level of governance for air quality control. Specific trainings would be imparted for adequate handling of the IT based userinterface of air quality forecasting systems to generate air quality alerts and advisories.

6.9 Behavioural change communication techniques to spread awareness to different stakeholder groups

The information generated through the project would need to be translated into simpler forms for mass scale awareness generation purpose. Specific Behavioural Change Communication (BCC) techniques would be used to generate/develop awareness programs in different prioritised districts of the state in collaboration with state and district level government authorities.

In collaboration with MP SPCB, the project team will identify 5 districts and 5 interventions to employand assess various BCC techniques to spread awareness and change behaviours for faster adoption of technologies/strategies and enhance participation of stakeholdersfor control of pollution.

7. Deliverables

The following deliverables are producedin this project:

a) An IT-enabled air quality Decision Support System (DSS) for the state of Madhya Pradesh with requisite modules (including dynamic emission inventory and forecasting)
b) A state level action plan for air quality management for 5 years
c) An air quality emergencymanagement plan for cities in MP
d) Capacity building modules and trainings for multi-stakeholder air quality management

e) A report on behaviour changes communication and its impacts on awareness with stakeholders in MP

8. Time schedule

A project duration of 36 months is envisaged for this project. Annual reports will be submitted at the end of each year and a draft final report will be submitted with all its components after 36 months from the date of start. The final report will be submitted within 15 days of receipt of comments on the draft report.

Sl. No	Activity	Months											
		0-6		6-12		12-18		18-24		24-30		30-36	
1	Emission inventorisation												
2	Meteorological modelling												
3	Air quality simulations												
4	Source apportionment												
5	Future scenario analysis												
6	Cost-effectiveness analysis												
7	Short-term forecasting												
8	Development of IT-based DSS												
9	Running DSS operations for 1 year												
10	State level air quality management plan												
11	Air Quality emergency plan												
12	Development of capacity building modules												
13	Organizing capacity building programmes (10)												
14	Behavioural change communication studies and campaigns (5)												

15	Preparation of draft final report												

9. Budget

The total budget estimated for this work is INR 8.24 Crores which is equivalent to US$993,059 @ 1 US$ = INR 83.The break-up of the budget withrespect to various activities and deliverables is shown below.

Activities	Cost (INR in Crores)	Cost (US$) @ 83 INR/US$
Development of emission inventory at 10x10 km^2	0.50	60,241
Setting up the Modelling system and Model running (+2 years)	1.40	168,675
Userinterface and software development	0.50	60,241
Technical Assistance and Project Management	2.89	348,000
Capacity building module (1) and programmes (10)	0.95	114,458
Behavioural change studies and campaigns (5)	0.50	60,241
Travel	0.20	24,096
Major workshops (4)	0.15	18,072
Misc (2%)	0.14	17,080
UNEP’s Programme Support Costs (14%)	1.01	121,955
Total	8.24	993,059