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GRADED RESPONSE ACTION PLAN

Why in the news?

Commission for Air Quality Management in NCR & Adjoining Areas (CAQM) announced a revision in the existing GRAP to abate air pollution in the region.

About Graded Response Action Plan

- GRAP is a **set of emergency measures** that kick in **to prevent further deterioration of air quality** once it reaches a certain threshold **in the Delhi-NCR region.**

- It was **approved by the Supreme Court in 2016**

Implementation

- Till 2020, the Supreme Court-appointed Environment Pollution (Prevention & Control) Authority (EPCA) used to order States to implement GRAP measures.
- From 2021 onwards, the GRAP is being implemented by the CAQM.

- The EPCA was dissolved and replaced by the Commission for Air Quality Management (CAQM) in 2020.

Commission for Air Quality Management in NCR & Adjoining Areas (CAQM)

Genesis: First in 2020 and later given **statutory body** status through Commission for Air Quality Management in **National Capital Region and Adjoining Areas Act, 2021.**

Mandate: Improve **coordination, research, identification and resolution** of problems surrounding the air quality index.

Sub-Committees: The commission is required to form sub-committees **on Monitoring and identification, safeguarding and enforcement, and research** and development.

GRADED RESPONSE ACTION PLAN (GRAP)

- CAQM relies on air quality and meteorological forecasts by
- the Indian Institute of Tropical Meteorology (IIITM)-Pune and the India Meteorological Department (IMD).

Graded response action plan (GRAP)

is based on National Air Quality index (AQI)

AQI

AIR QUALITY INDEX

National Air Quality index (AQI)

Launched in 2014 with outline 'One Number – One Color -One Description' for the common man to judge the air quality

The measurement of air quality is based on eight pollutants, namely:

- ✓Particulate Matter (PM10),
- ✓Particulate Matter (PM2.5),
- ✓ Nitrogen Dioxide (NO_2),
- ✓Sulphur Dioxide (SO_2),
- ✓Carbon Monoxide (CO),
- ✓Ozone (O_3),
- ✓Ammonia (NH_3), and
- ✓ Lead (Pb).

AQI has six categories of air quality.

Good, Satisfactory, Moderately Polluted, Poor, Very Poor and Severe.

AQI Category	AQI	Concentration range*							
		PM_{10}	$PM_{2.5}$	NO_2	O_3	CO	SO_2	NH_3	Pb
Good	0 - 50	0 - 50	0 - 30	0 - 40	0 - 50	0 - 1.0	0 - 40	0 - 200	0 - 0.5
Satisfactory	51 - 100	51 - 100	31 - 60	41 - 80	51 - 100	1.1 - 2.0	41 - 80	201 - 400	0.5 - 1.0
Moderately polluted	101 - 200	101 - 250	61 - 90	81 - 180	101 - 168	2.1 - 10	81 - 380	401 - 800	1.1 - 2.0
Poor	201 - 300	251 - 350	91 - 120	181 - 280	169 - 208	10 - 17	381 - 800	801 - 1200	2.1 - 3.0
Very poor	301 - 400	351 - 430	121 - 250	281 - 400	209 - 748*	17 - 34	801 - 1600	1200 -1800	3.1 - 3.5
Severe	401 - 500	430 +	250+	400+	748+*	34+	1600+	1800+	3.5+

* CO in mg/m^3 and other pollutants in $\mu g/m^3$; 2h-hourly average values for PM_{10}, $PM_{2.5}$, NO_2, SO_2, NH_3, and Pb, and 8-hourly values for CO and O_3.

Graded Response Action Plan

Graded response action plan (GRAP)
is based on National Air Quality index (AQI)

This plan specifies actions required for controlling particulate matter emissions from various sources and prevent PM10 and PM2.5 levels to go beyond 'moderate' national Air Quality Index (AQI) category.

GRAP with AQI

AIR QUALITY INDEX (AQI)	CATEGORY
0-50	Good
51-100	Satisfactory
101-200	Moderate
201-300	Poor
301-400	Very Poor
401-500	Severe

Category	Ambient Particulate Matter (PM) Concentration	Measures
Moderate to Poor	▪ PM 2.5 between 61-120 $\mu g/m^3$ ▪ PM10 between 101-350 $\mu g/m^3$	▪ Enforce pollution control in thermal power plants ▪ Mechanized sweeping on roads ▪ Ban on firecrackers ▪ Stop garbage burning
Very Poor	▪ PM2.5 between 121-250$\mu g/m^3$ ▪ PM10 between 351-430 $\mu g/m^3$	▪ Stop use of diesel generator sets ▪ Increase bus and metro services and increasing frequency of metro service ▪ Stop use of coal/firewood in hotels and open eateries
Severe	▪ PM2.5 more than 250$\mu g/m^3$ ▪ PM10 more than 430$\mu g/m^3$	▪ Increase frequency of mechanized sweeping of road and sprinkling of water on roads ▪ Close brick kilns, Hot Mix plants, Stone Crushers ▪ Shut down Badarpur power plant ▪ Introduce concessional rates to encourage off-peak travel in public transport.
Severe+ or Emergency	▪ PM2.5 of or more than 300$\mu g/m^3$ ▪ PM10 of or 500$\mu g/m^3$ **(persist for 48 hours or more)**	▪ Stop entry of diesel trucks into Delhi (except essential commodities) ▪ Stop construction activities ▪ Introduce odd and even scheme ▪ Shutting of schools

Significance of GRAP

Creating a **step-by-step plan** for the entire Delhi-NCR region

Getting on board several agencies such as all pollution control boards, industrial area authorities, etc

Fixes **accountability and Deadlines**

Pro-active policy formulation such as bringing BS-VI fuel to Delhi before deadline.

Help in **controlling air pollution** in NCR especially in winter

Citizen's Charter for **active participation**

Category	Ambient Particulate Matter (PM) Concentration	Measures
Moderate to Poor	• PM 2.5 between 61-120 µg/m^3 • PM10 between 101-350 µg/m^3	• Enforce pollution control in thermal power plants • Mechanized sweeping on roads • Ban on firecrackers • Stop garbage burning
Very Poor	• PM2.5 between 121-250µg/m^3 • PM10 between 351-430 µg/m^3	• Stop use of diesel generator sets • Increase bus and metro services and increasing frequency of metro service • Stop use of coal/firewood in hotels and open eateries
Severe	• PM2.5 more than 250µg/m^3 • PM10 more than 430µg/m^3	• Increase frequency of mechanized sweeping of road and sprinkling of water on roads • Close brick kilns, Hot Mix plants, Stone Crushers • Shut down Badarpur power plant • Introduce concessional rates to encourage off-peak travel in public transport.
Severe+ or Emergency	• PM2.5 of or more than 300µg/m^3 • PM10 of or 500µg/m^3 **(persist for 48 hours or more)**	• Stop entry of diesel trucks into Delhi (except essential commodities) • Stop construction activities • Introduce odd and even scheme • Shutting of schools

What are the revised measures?

Stage I – 'Poor' Air Quality (AQI 201-300): Enforce NGT / Hon'ble SC's order on over aged diesel / petrol vehicles.

Stage II - 'Very Poor' (AQI 301-400): Rigorous actions to combat air pollution at identified hotspots in the region.

Stage III - 'Severe' (AQI 401-450): Impose strict restrictions on BS III petrol and BS IV diesel four-wheelers in certain areas and may suspend physical classes in schools for primary grade children up to Class 5.

Stage IV - 'Severe Plus' (AQI >450) : four-wheelers registered outside Delhi, except for electric vehicles, CNG vehicles, and BS-VI diesel vehicles, will not be allowed to enter the city.

Why Delhi needs such measures?

since 2014, World Health Organization (WHO) declared Delhi the most polluted city in the world.

- Pollution levels in Delhi increase dramatically during winter

Reasons behind high pollution levels?

- Construction work, industrial and vehicular pollution — in and around the city.

- The situation is aggravated at the start of winter by smoke from stubble-burning in northwestern states, coupled with unfavourable meteorological conditions, such as calm winds, low temperatures, and fewer sunny days.

Delhi govt to spray bio-decomposer in fields to prevent stubble burning:

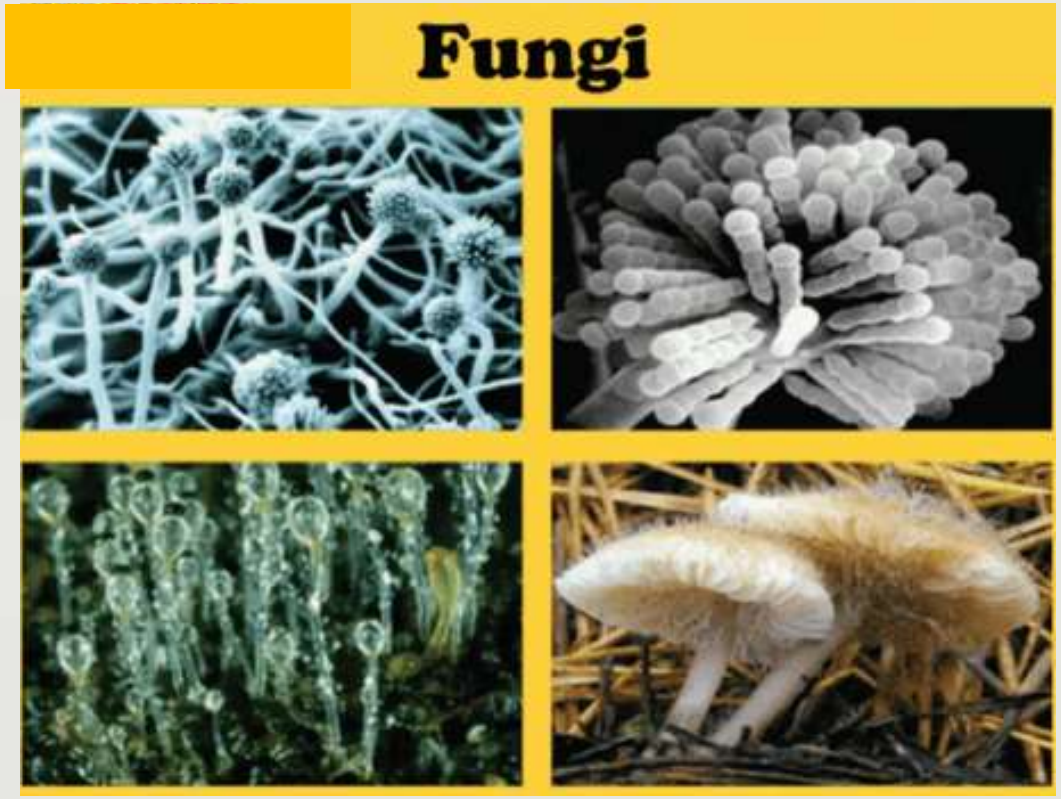
- Indian agriculture Research Institute (IARI) has developed capsules containing bio-decomposers.
- These capsules are mixed with a solution.
- When applied on fields, it dissolves the stem of stubble, converts it into compost, fertility of land increases and less fertilizer is used.

How were these bio-decomposers formed?

Pusa Decomposer is a mix of seven fungi that produce enzymes to digest cellulose, lignin and pectin in paddy straw.

- The fungi thrive at 30-32 degree Celsius, which is the temperature prevailing when paddy is harvested and wheat is sown (oct-nov).

The IARI has commercialized the technology. It has licensed companies.



Smog Tower for pollution control in NCR

A smog tower is **a structure designed to work as a large-scale air purifier.**

How it works?

This structure **fitted with multiple layers of filters** which **trap fine dust particles** suspended in the air as it passes through them.

Air is drawn through fans installed at the top of the tower, passed through filters, and then released near the ground.

Are smog towers helpful?

Yes, smog towers have been experimented with in recent years in cities in the Netherlands, China, South Korea and Poland.

The first such tower was erected in 2015, in Rotterdam, Netherlands (it can filter 30,000 cubic meters of air per hour around it).

Experts have said that the towers would create "clean air zones" in the city. A tower would reduce 50% of the particulate matter load

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