1. How long will Delhi Gasp for Breath?

Why in News?

- Delhi is considered one of the most polluted cities in the world. Air pollution is caused due to rising number of vehicles, industrial pollution, construction activities and a lessening green cover not commensurate with rapid urbanisation.

Major Reason for Poor Air Quality in Delhi:

- Air quality from mid-October to mid-November is worst, often slipping from severe to hazardous category. A major reason ascribed to poor air quality is **stubble burning in Punjab, Haryana and parts of UP.** The situation gets compounded by lighting of firecrackers on Diwali.
- The National Green Tribunal (NGT) and State Pollution Control Boards have issued several directions to states to control stubble burning, but without noticeable outcomes.

How did the Problem Start?

- Earlier, farmers of Punjab and Haryana used to grow three crops in a year: short-duration paddy in May that was harvested by mid-July; during Kharif **Farmers would go for late-sown high-yielding paddy**, for which free irrigation and procurement by government agencies were favourable and after harvest of Kharif paddy, high-yielding varieties of wheat were grown in the winter.
- **This delayed harvest of the crop** to October; a time when farmers are supposed to prepare land for wheat is causing a problem.
- And then there are other factors—increased straw production surpassing the demand of fodder, drastic **decline in agricultural workforce (labour) and increased mechanised harvesting operations.**

Short Term solutions:

- **Happy seeder is a tractor-mounted machine that sows (wheat) seeds without the need to till the field or remove existing paddy straw.** The remains of rice crop residue act as mulch, conserving soil moisture and improving soil health.
- Research shows such climate-smart practices lead to reduced carbon dioxide emissions, enhanced micro-biome activities in the soil, and less weed infestation.
- The usage of happy seeders has incrementally gone up, but hasn't caught up fast enough to make a perceptible dent on stubble burning. The cost of machines (1.5 lakh and above) is often cited as a reason for low adoption.

- Business models with lead farmers, farmers' cooperatives and service providers through custom-hiring centres have to be developed to provide machinery on demand.
- Massive awareness campaigns and capacity-building activities need to be undertaken for all the stakeholders.
- Initially, **subsidies on machines may be raised and farm cooperatives** and specialised start-ups may be encouraged to operate custom-hiring centres.
- **Gram Panchayats may also be made responsible** to take up such activities. Banks and financial institutions should provide capital assistance to desirous individuals/groups.
- **Machinery would displace manual labour.** It could, therefore, be suggested to engage agricultural labourers in the collection of paddy straws for production of manure and other purposes. Wages of these labourers could be met from the MGNREGA funds by Panchayati Raj institutions. This will generate employment.
- **A new cadre of trained human resource** would be needed to provide technical know-how to farmers. For this, attracting youth in agriculture would greatly help.
- **Cultivation of short-duration rice varieties suited for direct-seeded-rice (DSR)** method coupled with micro-irrigation could be tried as an alternative. DSR paddy takes less time for establishment and there is no transplanting shock to the plant.
- This method may significantly save irrigation water and advance the growing season (as no transplanting is done). This would widen the gap between paddy harvest and wheat sowing, thus potentially reducing burning problem.
- Baling of straw by suitable machines can clear the field for next sowing, and scientific binding of straw can be employed to address fodder scarcity in nearby areas.
- **Zero-tillage using happy seeder alone has the potential to solve half of the Residue Burning Issues.** It reduces GHG emissions, and also ensures remunerative income to farmers.

Medium to Long-Term Solutions:

- **Phasing out current subsidies provided on piecemeal basis** and transitioning towards a holistic farming approach through provisioning of payments for ecosystem services will provide farmers better opportunities to take wise decisions in accordance to their local circumstance.
- In addition to conservation agriculture, **high-value crops like fruits, vegetables,** maize, soybean, etc, could be replaced in stubble burning areas. Climate-resilient crops like sorghum and millet (nutri-cereals) could be planned.

- **Processing infrastructure to support a vibrant value chain linking** to the market would, however, be needed. Also, making pellets/briquettes from paddy straw for their use in (thermal) power plants, use of stubble in bio-refineries (bio-ethanol), biomass gasification, etc, have been suggested as solutions to utilise paddy straw.

Conclusion:

- **India is world's third-largest emitter of GHGs.** As per a report submitted by the government of India to the UNFCCC, crop-residue burning accounts for 2% of GHG emissions within the agriculture sector.
- Effective mitigation measures with contextual adaptation practices as suggested above would reduce stubble burning, thus lessening the load on the environment and possibly making the Delhi Air Cleaner.