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LEGAL PATHWAY TO PHASE OUT ODS: MONTREAL PROTOCOL AND INDIA

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ABSTRACT

The Earth's ozone layer, a critical shield against harmful ultraviolet radiation, has faced unprecedented challenges due to human activities since the 1970s. The discovery of ozone depletion led to global concern and culminated in the Montreal Protocol of 1987, a landmark international agreement aimed at phasing out ozone-depleting substances (ODS). This paper explores the history, impacts, and regulatory frameworks established under the Montreal Protocol and its subsequent amendments, highlighting efforts by nations, particularly India, to curb ODS production and consumption. Through comprehensive legislative measures and international cooperation, significant strides have been made in mitigating ozone depletion, with projections suggesting a full recovery by 2065. However, the journey to safeguarding the ozone layer remains fraught with challenges, necessitating continued vigilance, technological innovation, and public awareness to ensure a sustainable future for all life on Earth.

Keywords: Ozone layer, Montreal Protocol, Ozone depletion, International cooperation Sustainable future

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"Earth shall quench your thirst but greed, it may not"

From times immemorial earth has subsisted and has been abode of many living species before human existed and shall serve as an abode for future species as well. Witnessing the self-destructive and depleting activities of modern humanity in the late 1980s a formal regime was agreed between the world government to be structured under the Montreal Protocol. Its objective was to guard earth's protective outer layer i.e., ozone layer by eliminating and diminishing the usage of substances which were consequent of human residential and commercial activities and were detected as being ozone depleting. These substances were thus known as ODS (Ozone Depleting Substances).

As agreed and assented, Europe in its action to achieve the objectives implemented the Protocol through measures such as EU-wide legislation which were stricter and more ambitious in their approach.

Due to the preventive actions adopted globally by the nations under the Montreal Protocol it was possible to hault the depletion of the ozone layer and was witnessed as recovering, but till today human efforts have been found to be lacking and pendency of recovery is still to be ensured.

Acting as the "Sunscreen to Earth" the Stratospheric Ozone layer protects the all lifeforms on the earth from exposure to the ultraviolet (UV) radiations constantly emitted from the sun. However, emission of substances damaging the ozone layer has increased the probability of acute exposure to the harmful radiations of the sun. Therefore, to decrease the risk of lifeforms getting impaired varied domestic and international actions have been formulated and implemented which have in-turn facilitated the healing process of the ozone layer and is estimated to be fully recovered by the year 2065.

The Protective Shield: Ozone Layer

The Ozone layer is a layer of gas occurring naturally in the upper atmosphere which protects all life forms i.e., flora and fauna from the destructive Ultra-violet (UV) radiations emitted from the sun directly.

Ozone (O_3) as "an unstable, pale-blue gas with a penetrating odour."[1] Ozone is an unstable form of oxygen; wherein one Ozone molecule contains three oxygen atoms. However, we breathe oxygen to live but due to the instability of Ozone (O_3) inhaling ozone in its occurring

[1] Billy C. (1994): Refrigerant Management. Albany: Delmar Publishers Inc.

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form is detrimental to human health.

When we move upwards the oxygen drifts and passes a layer called the troposphere which supports all lifeforms inhabiting the earth, and further advances towards the stratosphere, which is situated above the troposphere. It is here that Ultra-violet rays emitted from the sun hits the oxygen and causes the oxygen to break up into unstable ozone (O_3) molecules.

However, there are two types of ozone:

- **Stratospheric Ozone**: Mostly considered as the "good" ozone. Acting as the protective shield and most often referred to as “Sunscreen to Earth”, it is found about, 6 to 30 Miles above the earth, floating over everyone's heads. It absorbs and scatters ultraviolet radiations emitted from the sun, and hence obstructs these harmful rays from reaching the surface of the earth and therefore reduces the risks of direct exposure to these harmful radiations. Moreover, it also helps to prevent excessive heat to escape from the earth. While, at the same time, it also keeps the earth protected from overheating.
- **Atmospheric Ozone:** It is considered as to be the "bad" ozone and occurs closer to the earth, when compared to the Stratospheric Ozone. Atmospheric Ozone is formation is triggered when Smog i.e., Fog and Smoke and other polluting gases combine with sun's UV rays. However, inhaling this type of air is hazardous and unhealthy to the human health.[2]

Weakening of the Protective Shield: Ozone Depletion

In the year 1970, the scientists discovered the phenomena of depletion of ozone layer. Further, after many researches it was found to that atmospheric concentration of ozone levels varied naturally and majorly depended on atmospheric temperature, weather, latitude, altitude and was also strongly affected by the substances which are ejected directly in to the environment by natural events such as volcanic eruptions.

Moreover, this natural phenomenon could not sufficiently clarify the depleting levels of ozone layer and further observations of scientific evidence revealed the actual existing position that certain man-made chemicals and related activities were the focal point of the subsisting cause. Moreover, it was also found that these root substances liable for ozone depletion were mostly introduced during the booming period of advancement in the field of electronics in the year 1970 and onwards, in a wide range of industrial and consumer applications which majorly

[2] http://www.odec.ca/projects/2008/laic8c2/bg_ozonel.ayer.html

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included Refrigerators, Air Conditioners and Fire Extinguishers.[3]

Undo the Human Doing: Efforts Worldwide

As the world has transitioned from a primitive society to a more modern and advanced society, humans have evolved from practising a simpler life style to a more complex one. In the process of bettering our lives, the environment around us has been at the receiving end. The need for maintaining a balance between the co-existence of humans and nature has now increased manifolds and hence we have stepped on to achieve a sustainable subsistence and future.

International Conventions on Protection of Ozone Layer

1. **Montreal Protocol (26th August, 1987):** The Montreal Protocol was an international treaty themed and formulated with an objective to regulate the manufacturing and usage of substances that were the probable cause of depletion of the Ozone Layer by eliminating the production of substances that were found to be responsible for ozone depletion.
2. **The Vienna convention for the Protection of the Ozone Layer (22nd March, 1985)**: The Vienna Convention in line with other preceding environmental protocols provided for a framework reducing the production of CFCs (Chlorofluorocarbons) internationally which were responsible for their contribution to the impairment of the Ozone Layer.

Various Legal Regulation in India with special reference to Ozone Layer Protection

1. In exercise of the powers conferred by Sections 6, 8 and 25 of the Environment (Protection) Act, 1986, the Central Government formulated the Ozone Depleting Substances (Regulation and Control) Rules, 2000, under which provisions have been provided to regulate and control the depletion of ozone layer and its protection.
2. Under the Part – IV – A, Article 51 – A (g) of the Fundamental Duties of the Indian Constitution enshrines that for protection and improvement of the environment it is the duty of every citizen of India to protect in improve the natural environment.
3. Under the Schedule – VII of the Indian Constitution, 'Environment' i.e., Entry 17 – A is a subject under the Concurrent List (List - 3) thus creating a scope for control by both

[3] Falk, Jerry (2006): Social Studies, Eleven Standard Workbook: Second Edition. Surrey Hazelmere Publishing.

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the Central Government and the State Government on policies, regulations and action plans.

4. Ministry of Environment, Forest and Climate change established 'Ozone Cell' for the protection of Ozone Layer and prepared a detailed 'Country Program' (CP) in 1993 with an objective of eliminating Ozone Depleting Substances (ODSs) in line with the National Industrial Development Strategy following the footsteps of the Montreal Protocol[4].
5. Various measures have been taken by the Indian Government in controlling and marshalling the depletion of Ozone Layer under the Ozone Protection Program such as, *Accelerated CFC Production Sector Phase-Out Project, National CTC Phase-Out Plan, National Strategy for Transition to Non-CFC MDIs and Plan for Phase-out of CFCs in the Manufacture of Pharmaceutical MDIs and HCFC Phase-out Management Plan (HPMP) – Stage-I and Stage – II.*[5]

India's Towards Phasing Out: ODS

India's with its phasing out attempts of the Ozone Depleting Substances (ODS) has recorded successful projection in reduced Greenhouse Gas (GHG) emissions by 465 million tonne CO_2 equivalent and has witnessed a upward trajectory of reduced CO_2 equivalent of up to 778 million tonnes, by the year 2030.[6]

Moreover, India complying with the Montreal Protocol phased ozone depleting substances such as CFCs, CTCs, halons and HCFCs in the year 2010. Moreover, due to its stringent adherence to the International and National environmental policies India in the year 2020 phased out HCFC-141b (Hydrochlorofluorocarbon) i.e., a variety of ozone depleting chemicals after CFC.

[4] http://ozonecell.nic.in/home-page/about-us/about-the-ozone-cell/
[5] http://ozonecell.nic.in/home-page/about-us/about-the-ozone-cell/
[6] Divyani Dubey, Explained: Where does India Stand in Saving Ozone Layer, 17th September, 2022, From: https://www.factchecker.in/explained/explained-where-does-india-stand-in-saving-ozone-layer835244#:~:text=India%20had%20to%20phase%20out,production%20and%20consumption%20of%20ODS.

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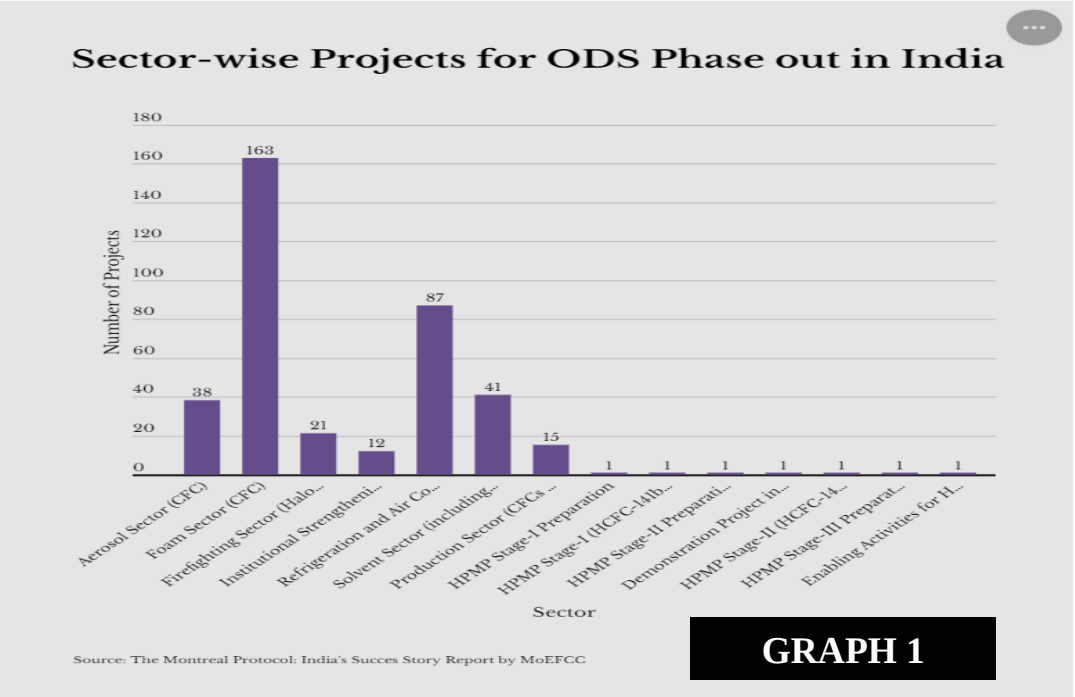

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Graph 1 shows that various sector specific projects directed towards regulating and phasing out the ODS was implemented by the Government of India i.e., till 2022 a total of 384 projects were approved and funded under the Montreal Convention. Phasing out of Halons was achieved in the year 2003, simultaneously the year 2008 witnessed the phasing out of CFCs followed by CTCs in the year 2010. However, CFCs used in the manufacturing of inhalers for asthma and Chronic Pulmonary diseases was not discontinued. However, **Graph 2** shows that, production and consumption of Methyl Chloroform and Methyl Bromide was also phased out in the year 2020 due to which India's ODS values were reduced considerably. Under the HCFC Phase-down Management Programme (HPMP) the process of phasing out of HCFCs is being carried out in consonance with the Montreal Protocol. Moreover, Stage-I and Stage-II are under implementation and will be completed by the end of 2023. However, HPMP's Stage-III to phase out remaining HCFCs, will be implemented during the period of 2023-2030.[7]

[7] Divyani Dubey, Explained: Where does India Stand in Saving Ozone Layer, 17, September, 2022, From: https://www.factchecker.in/explained/explained-where-does-india-stand-in-saving-ozone-layer835244#:~:text=India%20had%20to%20phase%20out,production%20and%20consumption%20of%20ODS.

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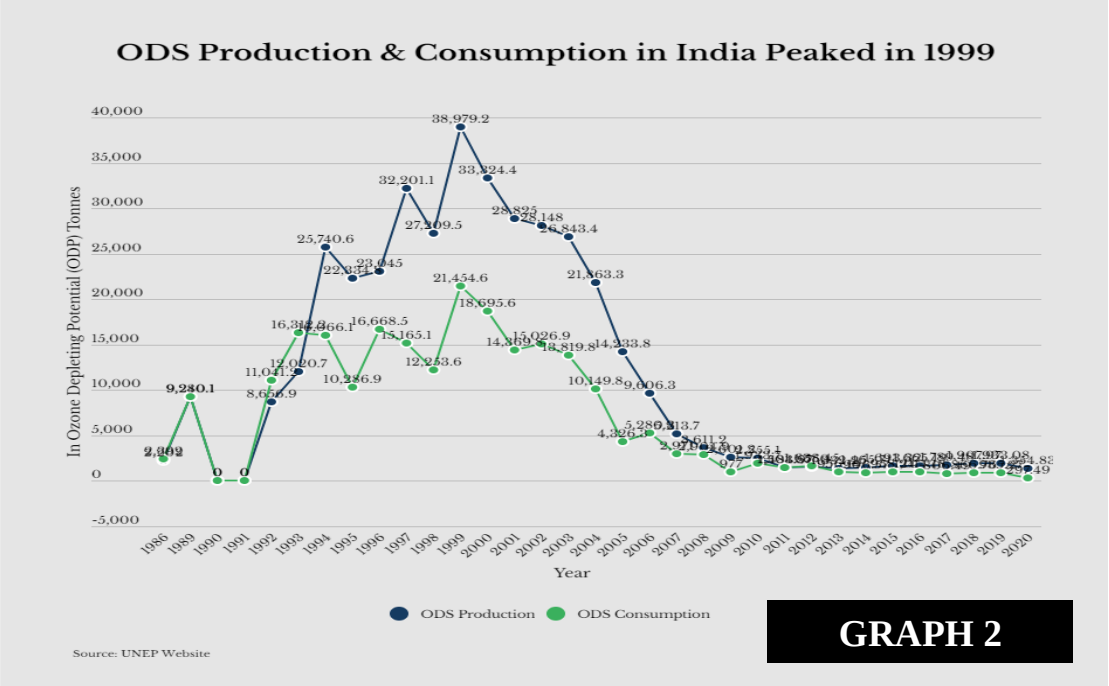

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Moreover, to strengthen its affirmations in relation to the Montreal Protocol India signed the Kigali Agreement, 2016. The Agreement to control and regulate the usage of HFCs and maintaining a balance and to combat climate change, added HFCs to the list of controlled substances and to shift to the use of low Global Warming Potential (GWP) alternatives. In furtherance to the Agreement, India in the year 2021 ratified the amendment with an objective to allow appropriate control of the production and consumption of HFCs by 2024.[8]

Therefore, India has successfully executed the international blueprints with precisely accessing the technical and financial assistance as supported under the Protocol mechanism.[9]

Conclusion

Depletion of ozone has an intrinsic linkage with human activities and is a continuing

[8] Divyani Dubey, Explained: Where does India Stand in Saving Ozone Layer, 17, September, 2022, From: https://www.factchecker.in/explained/explained-where-does-india-stand-in-saving-ozone-layer835244#:~:text=India%20had%20to%20phase%20out,production%20and%20consumption%20of%20ODS.

[9] India has successfully phased out production, consumption of ozone depleting substances: MoS Choubey, The Hindu, 16, September, 2022, From: https://www.thehindu.com/news/national/india-has-successfully-phased-out-production-consumption-of-ozone-depleting-substances-mos-choubey/article36496299.ece

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crisis potentially capable of impacting environment and subsistence of entire plausible lifeform. Varied Ozone Depleting Substances (ODSs) such as CFCs[10] and CTCs[11], HCFCs and Halons posed considerable threat in the maintenance and recovery of the ozone layer which was left unquestioned at an initial level of creation. Therefore, to shape our upcoming learnings it is imperative for us to have a glance at the past.

Undoubtedly speaking, ozone layer needs to be protected and an entire regime of positive governmental measures and policies are to be formulated with a progressive direction in line with the principles of sustainable development. However, though HCFCs[12] and HFCs (replacements of CFCs) have aided in curbing the issue of ozone layer depletion and therefore controlling the worldwide issue of global warming. This is the case to be found for many substitutes, and hence it is strongly believed that latest technologies, must advance with an objectivity of developing safe eco-friendly alternatives.

In bona fide adherence to the Montreal Protocol, the ozone layer is estimated to be recovered completely by 2065, 60% of CFCs emissions can be eliminated by conservation and through the use of CTC substitutes. Moreover, during a research in 2003, it was found that the hole at the South Pole was discovered to have become smaller, so the measures implemented in the past 15 years might not have been made in vain. The future looks brighter already.

Suggestions

1. Indian environmental laws should be formulated keeping in mind the Montreal Protocol and the Vienna Conventions.
2. An environment friendly usage framework shall be devised to completely eliminate controlled and uncontrolled emissions of ODSs such as CFCs, CTCs and dichloromethane.
3. Central and State Government should organise Recalling and seizures and destruction of Chlorofluorocarbons (CFCs), Halons, and Hydrochlorofluorocarbons (HCFCs) by the government at both Central and State levels.
4. Production of HCFCs, Methyl Bromide and Nitrous Oxide should be mitigated and eliminated under the phase-out projects run under the aegis of the Ministry of Environment, Indian Government.

[10] Chlorofluorocarbons
[11] Carbontetrachloride
[12] Hydrochlorofluorocarbons

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5. Under the Montreal Protocol, Research and development of chemicals with low global warming potential (GWP) substances should be accelerated.
6. In consonance with the climate benefiting Kigali Amendment of 2016 developing of an innovative ecosystem for low-GWP technology, integration of issues related to energy productivity, refrigerants, reduction in cooling load and focus on the servicing sector should be the pivotal point of focus.[13]
7. The central government also initiated development of a long-term India Cooling Action Plan in 2019 which provided a road-map to fulfil the country's cooling needs.
8. Laxity in the will to implement laws on environmental protection should be checked time and again by the respective ministries.
9. People should be made aware about the pressing global issue of ozone depletion and its effects on human life and other forms subsisting on earth.
10. Environmental Protection Awareness Programs (EPAP) should be organised regularly to sensitise people at the root levels to develop a primary understanding towards the issue.
11. Public gathering centres such as schools, colleges and other institutions should have regular access to these General Awareness Programs and Schemes (GAPS).

[13] Divyani Dubey, Explained: Where does India Stand in Saving Ozone Layer, 17th September, 2022, From: https://www.factchecker.in/explained/explained-where-does-india-stand-in-saving-ozone-layer835244#:~:text=India%20had%20to%20phase%20out,production%20and%20consumption%20of%20ODS.

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