

SUNDAY OBSERVER

IMPACT

features.suo@lakehouse.lk / Tel: 011 2 429 429, 011 2 429 228 / Fax: 011 2 429 227

SEPTEMBER 18, 2022

Sept 16

was International Day
for the Preservation
of the Ozone Layer



Healing the ozone layer, protecting the earth

BY PRAMOD DE SILVA

Living in space is not easy. Living on Earth as it travels through space, we are potentially bombarded by everything from cosmic rays to meteorites. Ironically, it is our life-giving Sun that could pose the greatest danger in the form of harmful Ultra Violet (UV) radiation. But the Earth fortunately has a defence mechanism to protect all life on the Planet from these harmful rays.

It is called the Ozone Layer, a fragile shield of gas that protects the Earth from the harmful portion of the rays of the Sun, thus helping preserve life on the Planet. However, this layer was drastically damaged by certain chemicals we used on a mass scale.

Extremely damaging

A number of commonly used chemicals have been found to be extremely damaging to the ozone layer. Halocarbons are chemicals in which one or more carbon atoms are linked to one or more halogen atoms (fluorine, chlorine, bromine or iodine). Halocarbons containing bromine usually have much higher ozone-depleting potential (ODP) than those containing chlorine. The man-made chemicals that have provided most of the chlorine and bromine for ozone depletion are methyl bromide, methyl chloroform, carbon tetrachloride and families of chemicals known as halons, chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs).

The good news is that the world's Ozone Layer is on track to be completely healed by the 2060s, according to modelling by the UN's environmental agency (UNEP). In the past 21 years, parts of the Ozone Layer have recovered at a rate of one to three percent every ten years, the UNEP has found.

If this continues, the Northern Hemisphere's Ozone Layer is set to heal completely by the 2030s, the Southern Hemisphere by the 2050s, and the two Polar Regions in the following decade.

Montreal Protocol

On December 19, 1994, the United Nations General Assembly proclaimed September 16 as the International Day for the Preservation of the Ozone Layer. This commemorates the date, in 1987, on which the Montreal Protocol on Substances that Deplete the Ozone Layer was signed. The Protocol came into effect in 1989.

The Montreal Protocol is both an inspirational example of how humanity is capable of cooperating to address a global challenge and a key instrument for tackling today's climate crisis.

Under this international treaty, nations have worked for 32 years to slash the use of ozone-depleting chemicals, used largely by the cooling industry. As a result, the Ozone Layer that shields

us from the sun's harmful ultraviolet radiation is healing.

But what is the Ozone Layer and why is it important? Ozone is a special form of Oxygen made up of three oxygen atoms rather than the usual two Oxygen atoms. The Ozone Layer is a deep layer in the stratosphere encircling the Earth that has large amounts of Ozone. The layer shields the entire Earth from much of the harmful UV radiation that comes from the Sun. It is also this UV radiation that forms the Ozone in the first place. It usually forms when some type of radiation or electrical discharge separates the two atoms in an oxygen molecule (O₂), which can then individually recombine with other oxygen molecules to form Ozone (O₃).

The Ozone Layer became more widely appreciated when it was realized that certain chemicals mankind manufactures, find their way up into the Stratosphere where, through a complex series of chemical reactions, they destroy some of the Ozone. As a result of this discovery, an International Treaty was signed and the manufacture of these chemicals was mostly stopped. The Ozone Layer has since begun to recover as a result of these efforts.

The Ozone Layer is thus a very important part of our planet and a natural mechanism to shield us and the ecosystem from the dangers posed by the Sun, which also gives us life. The depletion of the Ozone layer has led to serious health risks for the Earth's population.

The Montreal Protocol and other treaties liberate us from a number of man-made chemicals that have threatened life on Earth: chlorofluorocarbons (CFCs) and halons among others. The phasing out of existing products (those manufactured before 2010) is expected to be completed by 2030. Alternatives have been developed for these substances often used in air-conditioning and refrigeration, agriculture, energy generation, medicine and precision laboratory measurements. Since the Montreal Protocol came into effect, the atmospheric concentrations of the most important Chlorofluorocarbons and related chlorinated hydrocarbons have decreased.

This is a landmark achievement in a world that is often divided on many issues of critical importance, from disarmament to trade. The Montreal Protocol has been a resounding success due to its universal adoption and implementation.

Ultimate objective

The Protocol was signed "recognising that worldwide emissions of certain substances can significantly deplete and otherwise modify the Ozone Layer in a manner that is likely to result in adverse effects on human health and the environment".

The signatory States were "determined to protect the Ozone Layer by taking precautionary measures to con-

trol equitably total global emissions of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge".

It would be futile to treat Climate Change and the depletion of the Ozone Layer separately. The emission of Greenhouse Gases especially in developed countries has led to temperature changes and coupled with Ozone depletion, the result would have been disastrous. Now the world is acting fast to reverse both these dangers. The Ozone program has been a success, and the other too can be a success with international cooperation.

The effects of CFCs on the upper atmosphere were first discovered in 1973 by Frank Sherwood and Mario Molina at the University of California, Irving. They discovered that CFC molecules were stable enough to remain in the atmosphere until they got up into the middle of the stratosphere where they would finally (after an average of 50-100 years for two common CFCs) be broken down by UV

radiation, releasing a Chlorine atom. Rowland and Molina suggested that these Chlorine atoms might cause the breakdown of large amounts of Ozone in the stratosphere. Molina and Rowland were awarded the 1995 Nobel Prize for Chemistry for their discovery.

They found that since Stratospheric Ozone absorbs most of the ultraviolet-B (UV-B) radiation reaching the surface of the planet, the depletion of the Ozone Layer by CFCs would lead to an increase in UV-B radiation at the surface, resulting in an increase in skin cancer and other impacts such as damage to crops and to marine phytoplankton.

Ozone Hole

The Rowland-Molina theory was disputed by representatives of the aerosol and halocarbon industries. But later tests, and the discovery of the famous polar "Ozone Hole" in 1985 showed that their theory was correct. This discovery was made by British

Antarctic Survey scientists, who published their research in the journal Nature.

The good news is that the work of these pioneers was not in vain. The most recent scientific evaluation of the effects of the Montreal Protocol states, "The Montreal Protocol is working: There is clear evidence of a decrease in the atmospheric burden of Ozone-depleting substances and some early signs of Stratospheric Ozone recovery."

The principal aim of the Montreal Protocol is to protect the Ozone Layer by taking measures to control the total global production and consumption of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge and technological information.

The phase-out of controlled uses of Ozone depleting substances and the related reductions have not only helped protect the Ozone Layer for present and future generations, but have also contributed significantly to global efforts to address Climate Change. It has protected human health and ecosystems by limiting the harmful UV radiation from reaching the Earth.

The Montreal Protocol requires the control of nearly 100 chemicals, in several categories. For each group or annex of chemicals, the Treaty sets out a timetable for the phase-out of production and consumption of those substances, with the aim of eventually eliminating them completely. The HCFC phase-out schedule was introduced in 1992 for developed and developing countries, the latter with a freeze in 2015, and final phase-out by 2030 in developed countries and 2040 in developing countries. On September 16, 2009, the Vienna Convention and the Montreal Protocol became the first treaties in the history of the United Nations to achieve universal ratification.

Today, there is a great public awareness on the need to buy products that will not harm the Ozone Layer. For example, many advertisements for refrigerators and air-conditioning units in the local and international press invariably mention that they run on Ozone-friendly gas, instead of the older harmful gases. Many buyers ask the sales personnel at shops whether the compressor gas is environment and Ozone friendly before pulling their wallets out. This shows that the message has filtered through to the general public.

Good track record

Sri Lanka indeed has a very good track record in complying with the Montreal Protocol with all stakeholders including the Government, industry, product manufacturers and importers, repairers and the public involved in the decades-long effort.

Sri Lanka is one of the developing countries that has implemented the Montreal Protocol successfully. The country has achieved the Protocol ob-

THE UN ENVIRONMENT PROGRAMME (UNEP) HAS HONoured SRI LANKA FOR ITS LONG-STANDING COMMITMENT TO PRESERVING THE OZONE LAYER. IN MAY 2011, THE LAUNCH OF THE FIRST 'OZONE FRIENDLY PURE CEYLON TEA' LOGO HIGHLIGHTED A REMARKABLE SUCCESS STORY OF A DEVELOPING COUNTRY COMPLYING WITH A GLOBAL ENVIRONMENTAL TREATY WHILE ALSO ENHANCING A MAJOR EXPORT INDUSTRY.

jectives well in advance and completed a successful journey of phasing out Ozone-depleting substances through various regulations and activities.

Global environmental treaty

The UN Environment Programme (UNEP) has honoured Sri Lanka for its long-standing commitment to preserving the Ozone Layer. In May 2011, the launch of first 'Ozone Friendly Pure Ceylon Tea' logo highlighted a remarkable success story of a developing country complying with a global environmental treaty while also enhancing a major export industry.

As the treaty turns 35 on this Ozone Day, we will remember how the Montreal Protocol ended one of the biggest threats ever to face humanity as a whole: the depletion of the ozone layer. When the world found out that ozone-depleting gases used in aerosols and cooling were creating a hole in the sky, they came together.

They showed that multilateralism and effective global cooperation worked and they phased out these gases. Now the ozone layer is healing, allowing it again to shield humanity from the Sun's UV radiation.

IT WOULD BE FUTILE TO TREAT CLIMATE CHANGE AND THE DEPLETION OF THE OZONE LAYER SEPARATELY. THE EMISSION OF GREENHOUSE GASES ESPECIALLY IN DEVELOPED COUNTRIES HAS LED TO TEMPERATURE CHANGES AND COUPLED WITH OZONE DEPLETION, THE RESULT WOULD HAVE BEEN DISASTROUS. NOW THE WORLD IS ACTING FAST TO REVERSE BOTH THESE DANGERS. THE OZONE PROGRAM HAS BEEN A SUCCESS, AND THE OTHER TOO CAN BE A SUCCESS WITH INTERNATIONAL COOPERATION.

