United Nations Environment Programme

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PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT • PROGRAMA DE LAS NACIONES UNIDAS PARA EL MEDIO AMBIENTE

ПРОГРАММА ОРГАНИЗАЦИИ ОБЪЕДИНЕННЫХ НАЦИЙ ПО ОКРУЖАЮЩЕЙ СРЕДЕ

UNEP

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BACKGROUNDER

Basic Facts and Data on the Science and Politics of Ozone Protection

1. The Ozone Layer

Ozone molecules (O_3) consist of three oxygen atoms. This poisonous gas is extremely rare in the atmosphere, representing just three out of every 10 million molecules. Ninety per cent of ozone exists in the upper atmosphere, or stratosphere, between 10 and 50 km (6-30 miles) above the earth. Ozone at ground-level, at the bottom of the troposphere, is a harmful pollutant resulting from automobile exhausts and other sources.

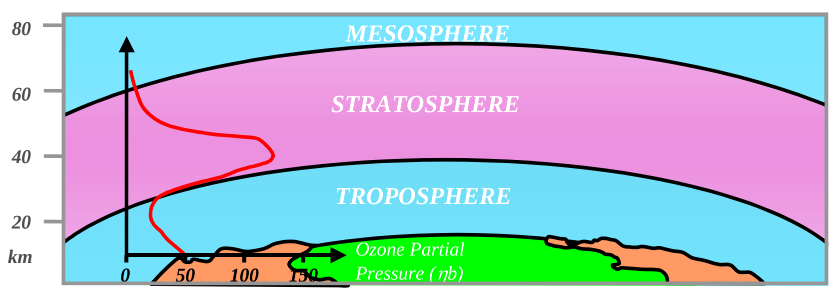

Figure 1 - Ozone Distribution in the Atmosphere

The ozone layer absorbs most of the harmful ultraviolet-B radiation from the sun. It also completely screens out lethal UV-C radiation. The ozone shield is thus essential to life as we know it. Depleting the ozone layer allows more UV-B to reach the earth. More UV-B means more melanoma and non-melanoma skin cancers, more eye cataracts, weakened immune systems, reduced plant yields, damage to ocean eco-systems and reduced fishing yields, adverse effects on animals, and more damage to plastics.

Scientific concern started in 1970 when Prof. Paul Crutzen pointed out the possibility that nitrogen oxides from fertilizers and supersonic aircraft might deplete the ozone layer. In 1974, Professors F. Sherwood Rowland and Mario J. Molina recognized that when CFCs finally break apart in the atmosphere and release chlorine atoms they cause ozone depletion. Bromine atoms released by halons have the same effect. The three scientists received the Nobel Prize for Chemistry in 1995 for their pioneering work.

The ozone layer over the Antarctic has steadily weakened since measurements started in the early 1980s. The problem is worst over this part of the globe due to the extremely cold atmosphere and the presence of polar stratospheric clouds. The land area under the ozone-depleted atmosphere increased steadily to more than 20 million sq km in the early 1990s and has varied between 20 and 29 million sq. km since then. The area of the ozone hole reached a record 29 million sq. kilometers on 12 September 2000; it extended to 27 million sq. km. in September 2003 and 24 million sq. km in 2004. While no hole has appeared elsewhere, the Arctic spring has seen the ozone layer over the North Pole thin by up to 30%, while the depletion over Europe and other high latitudes has varied between 5% and 30%.

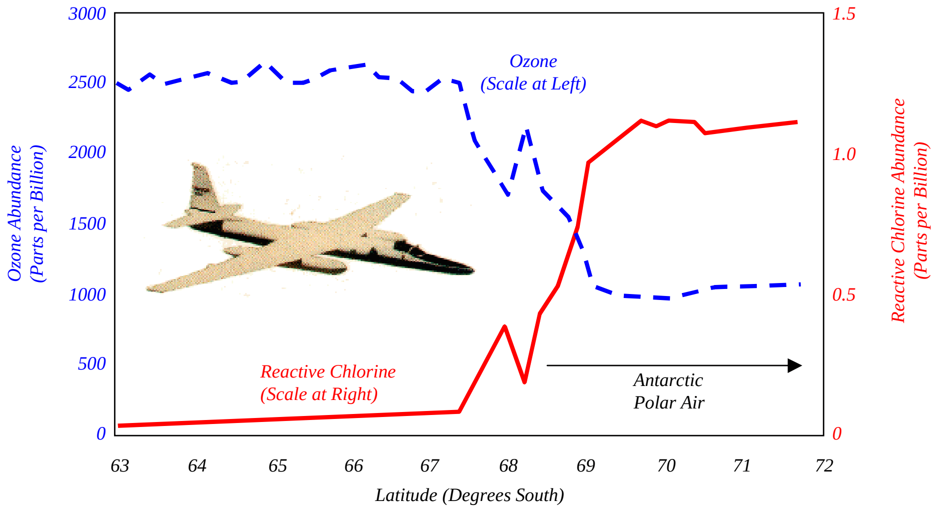

Figure 2 - Measurements of Ozone and Reactive Chlorine from a Flight Into the Antarctic Ozone Hole, 1987

2. Adopting and Ratifying the Vienna Convention, the Montreal Protocol, and Amendments to the Protocol

The issue of ozone depletion was first discussed by the Governing Council of the United Nations Environment Programme (UNEP) in 1976. A meeting of experts on the ozone layer was convened in 1977, after which UNEP and the World Meteorological Organization (WMO) set up the Coordinating Committee of the Ozone Layer (CCOL) to periodically assess ozone depletion. Intergovernmental negotiations for an international agreement to phase out ozone-depleting substances started in 1981 and concluded with the adoption of the Vienna Convention for the Protection of the Ozone Layer in March 1985.

The 1985 Vienna Convention encourages intergovernmental cooperation on research, systematic observation of the ozone layer, monitoring of CFC production and the exchange of information. The Convention commits its Parties to take general measures to protect human health and the environment against human activities that modify the ozone layer. The Vienna Convention is a framework agreement and does not contain legally binding controls or targets.

The Montreal Protocol on Substances that Deplete the Ozone Layer was adopted in September 1987. Following the discovery of the Antarctic ozone hole in late 1985, governments recognized the need for stronger measures to reduce the production and consumption of a number of CFCs (CFC-11, 12, 113, 114, and 115) and several Halons (1211, 1301, 2402). The Protocol was designed so that the phase-out schedules could be revised on the basis of periodic scientific and technological assessments. Following such assessments, the Protocol was adjusted to accelerate the phase-out schedules in London in 1990, Copenhagen in 1992, Vienna in 1995, Montreal in 1997, and Beijing in 1999. It has also been amended to introduce other kinds of control measures and to add new controlled substances to the list; the 1990 London Amendment included additional CFCs (CFC-13, 111, 112, 211, 212, 213, 214, 215, 216, 217) and two solvents (carbon tetrachloride and methyl chloroform), while the 1992 Copenhagen Amendment added methyl bromide, HBFCs and HCFCs. The Montreal Amendment of 1997 finalized the schedules for phasing out methyl bromide. The Beijing Amendment of 1999 included Bromochloromethane for immediate phase out; it also introduced production controls on HCFCs as well as controls on trade with non-Parties.

Governments are not legally bound until they ratify the Protocol as well as the Amendments. Unfortunately, while most governments have ratified the Protocol, ratification of the amendments and their stronger control measures lag behind. As of 21 November 2005, the Ozone Agreements had been ratified by countries as depicted in the figure 3 chart:

Ozone Protocol and Amendments Ratification Status

(Information sent to the Ozone Secretariat by the Depositary, UN Office of Legal Affairs, 21 November 2005)

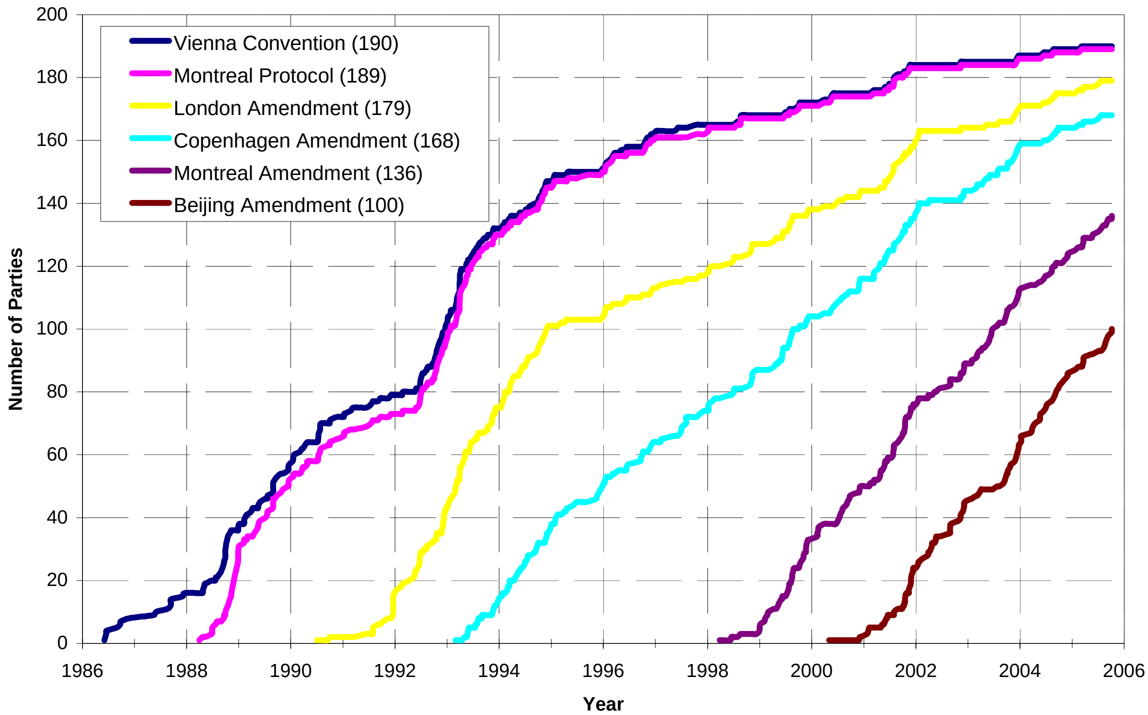

Figure 3 - Ratification Status of the Montreal Protocol and its Amendments.

3. The Chemicals And Their Phase-Out Schedules

Ninety-six (96) chemicals are presently controlled by the Montreal Protocol, including:

- ***Halo-carbons***, notably ***chlorofluorocarbons (CFCs)*** and ***Halons***. CFCs were discovered in 1928 and were considered wonder gases because they are long-lived, non-toxic, non-corrosive, and non-flammable. They are also versatile and from the 1960s were increasingly used in refrigerators, air conditioners, spray cans, solvents, foams, and other applications. CFC-11 remains in the atmosphere for 50 years, CFC-12 for 102 years, and CFC-115 for 1,700. Halon 1301 is used primarily in fire extinguishers and has an atmospheric lifetime of 65 years.
- ***Carbon tetrachloride*** is used as a solvent and takes about 42 years to break down in the atmosphere.
- ***Methyl chloroform*** (1,1,1-trichloroethane) is also used as a solvent and takes about 5.4 years to break down.
- ***Hydrobromofluorocarbons (HBFCs)*** are not widely used, but they have been included under the Protocol to prevent any new uses.
- ***Hydrochlorofluorocarbons (HCFCs)*** were developed as the first major replacement for CFCs. While much less destructive than CFCs, HCFCs also contribute to ozone depletion. They have an atmospheric lifetime of about 1.4 to 19.5 years.
- ***Methyl bromide (CH_3Br)*** is used as a fumigant for high-value crops, pest control, and quarantine treatment of agricultural commodities awaiting export. Total world annual consumption for controlled uses (not including uses for quarantine and pre-shipment) was about 30,000 tonnes in 2004. It takes about 0.7 years to break down.

- ***Bromochloromethane (BCM)***, a new ozone-depleting substance that some companies sought to introduce into the market in 1998, has been targeted by the 1999 Amendment for immediate phase-out to prevent its use.
- The Parties are considering measures to prevent the marketing of new ozone-depleting substances not so far covered by the Protocol.

The phase-out schedules for developed countries are as follows:

- Phase out Halons by 1994;
- Phase out CFCs, carbon tetrachloride, methyl chloroform, and HBFCs by 1996;
- Reduce methyl bromide by 25% by 1999, 50% by 2001, 70% by 2003, and phase out by 2005;
- Reduce HCFCs by 35% by 2004, 65% by 2010, 90% by 2015, and 99.5% by 2020, with 0.5% permitted for maintenance purposes only until 2030.
- Phase out HBFCs by 1996 and phase out BCM immediately.

Developing countries have a grace period before they must start their phase-out schedules. This reflects the recognition that developed countries are responsible for the bulk of total emissions into the atmosphere and that they have more financial and technological resources for adopting replacements. The developing country schedules are as follows:

- Phase out HBFCs by 1996 and phase out BCM immediately;
- Freeze CFCs, Halons and carbon tetrachloride at average 1995-97 levels by 1 July 1999, reduce by 50% by 2005, 85% by 2007, and phase out completely by 2010;
- Freeze methyl chloroform by 2003 at average 1998-2000 levels, reduce by 30% by 2005 and 70% by 2010, and phase out by 2015;
- Freeze methyl bromide by 2002 at average 1995-98 levels, reduce by 20% by 2005, and phase out by 2015; and
- Freeze HCFCs by 2016 at 2015 levels and phase out by 2040.

The phase-out schedules cover both the production and the consumption of the target substances. However, even after phase out both developed and developing countries are permitted to produce limited quantities in order to meet the essential uses for which no alternatives have yet been identified, e.g. the use of CFCs in metered dose inhalers for asthma. Production is defined as total production minus amounts destroyed or used as chemical feedstock. Consumption is defined as production plus imports minus exports. Trade in recycled and used chemicals is not included in the calculation of consumption in order to encourage recovery, reclamation and recycling.

4. What Have Been The Results So Far?

Without the Protocol, by the year 2050 ozone depletion would have risen to at least 50% in the northern hemisphere's mid latitudes and 70% in the southern mid latitudes, about 10 times worse than current levels. The result would have been a doubling of UV-B radiation reaching the earth in the northern mid latitudes and a quadrupling in the south. The amount of ozone-depleting chemicals in the atmosphere would have been five times greater. The implications of this would have been horrendous: 19 million more cases of non-melanoma cancer, 1.5 million cases of melanoma cancer, and 130 million more cases of eye cataracts.

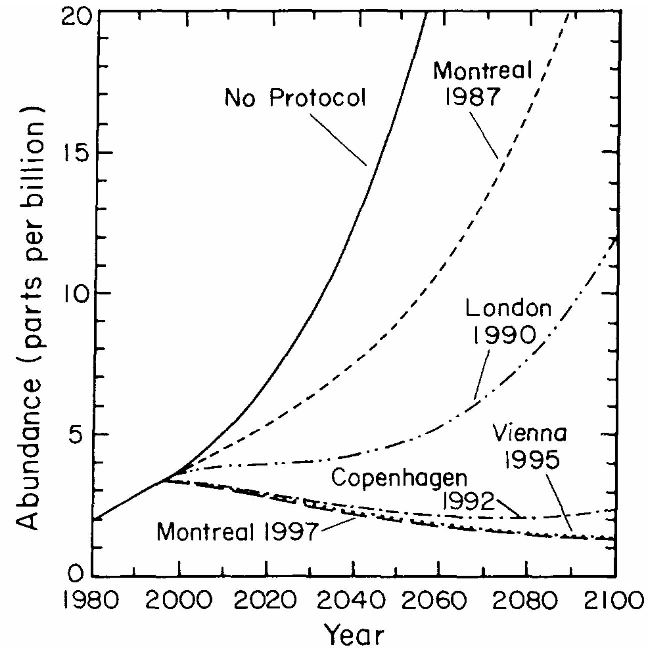

Figure 4.1 - Projection of what would have happened without the Protocol - Ozone Losses

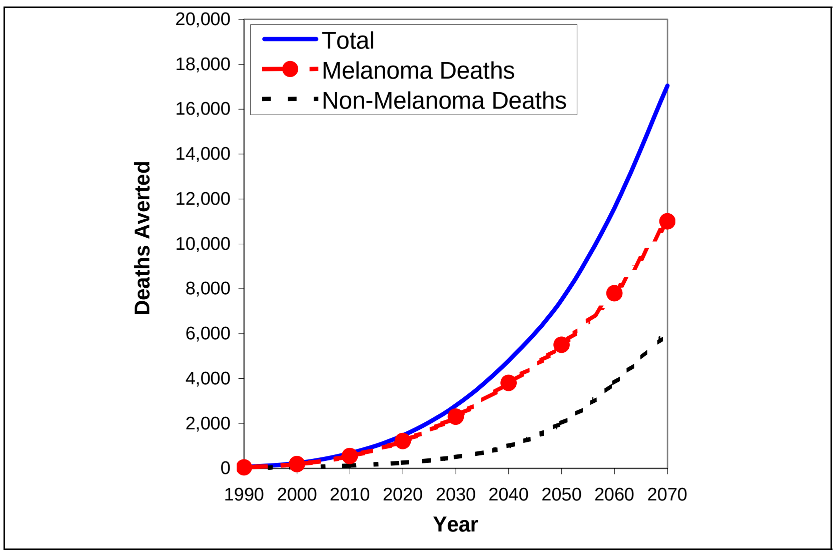

Figure 4.2 - Projections: Annual Deaths from Melanoma and Non-Melanoma Skin Cancer Averted due to the Montreal Protocol

In 1986 the total consumption of CFCs world-wide was about 1.1 million ODP tonnes; by 2004 this had come down to about 70,000 tonnes. (The ODP, or ozone-depleting potential, of a gas is based on comparing its impact on the ozone layer to that of CFC-11.) It has been calculated that without the Montreal Protocol global consumption would have reached about 3 million tonnes in the year 2010 and 8 million tonnes in 2060, resulting in a 50% depletion of the ozone layer by 2035. The bulk of the 1986 total, or about 0.9 million ODP tonnes, was consumed in developed countries, but this figure had declined to about 2,000 tonnes annually in the years 2003 and 2004, including consumption for exemptions approved by the Parties. By 2004, the developing countries had reduced their CFC consumption by about 60% from their maximum consumption in the mid-1990s.

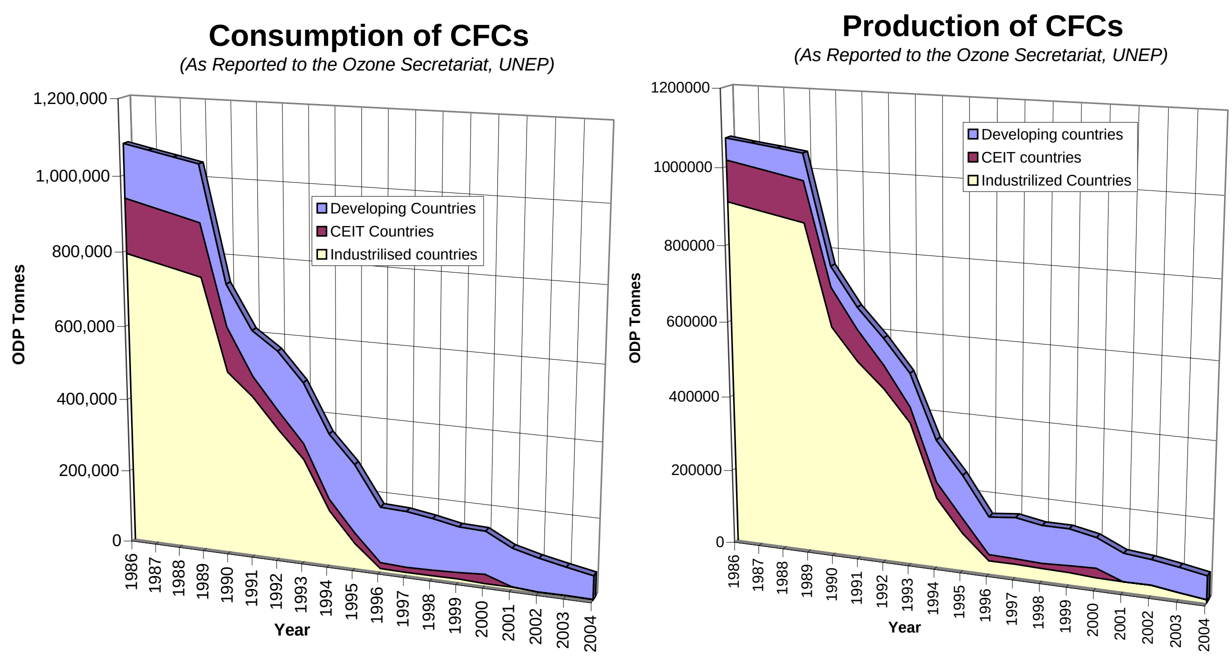

Figure 5 - Worldwide Production and Consumption of CFCs

Scientists predict that ozone depletion will reach its worst point during the next few years and then gradually reverse until the ozone layer returns to normal around 2050, assuming that the Montreal Protocol is fully implemented. The ozone layer is currently in its most vulnerable state. Despite declining CFC *emissions*, stratospheric *concentrations* are still increasing (although they are declining in the lower atmosphere) because long-lived CFCs emitted in earlier years continue to rise to the stratosphere. The atmospheric abundance of certain CFCs (notably CFC-11 and CFC-113), carbon tetrachloride, and methyl chloroform is declining. The abundance of most of the halons continues to increase. Concentrations of HCFCs and HFCs (see below) are, of course, increasing, since they are used as substitutes for the CFCs that are being phased out.

The success of ozone protection has been possible because science and industry have been able to develop and commercialize alternatives to ozone-depleting chemicals. Developed countries ended the use of CFCs faster and with less cost than was originally anticipated. Substitutes have proved particularly important in electronics. The foam-blowing sector has made use of water, carbon dioxide and hydrocarbons, as well as HCFCs. The refrigeration and air-conditioning sector has largely used HCFCs as alternatives, but new equipment is increasingly using replacements with zero ozone-depleting potential, including hydrofluorocarbons (HFCs), ammonia, and hydrocarbons.

HFCs have a high global warming potential and have been included in the basket of greenhouse gases controlled by the Kyoto Protocol to the Convention on Climate Change. Countries are now trying to minimise their emissions of HFCs.

Consumers are recycling existing Halons to gain time for developing substitutes for fire fighting. Other extinguishing agents such as carbon dioxide, water, foam, and dry powder are now widely used. Alternative approaches, such as good fire prevention practices, use of fire-resistant materials, and appropriate designs for buildings have significantly reduced the need for Halon systems, and total phase-out was achieved smoothly by 1994.

Countries are recovering and recycling CFCs from obsolete equipment and using it for maintenance of existing equipment.

Industrialized countries are concentrating their phase-out efforts on HCFCs and methyl bromide. They are trying to ensure that HCFCs are used only as direct replacements where other more environmentally suitable alternatives are not available. HCFCs were critical for meeting the early CFC phase-out goals but are generally considered undesirable for most new equipment because they do have some ozone-depleting potential and ozone-safe alternatives are available for most applications.

5. A summary of the 2002 findings of the Assessment Panels

The lastest assessment reports prepared by the Montreal Protocol Assessment Panels were completed in 2002. The significant progress that has been made since this time by researchers will be reflected in the next major assessments, which are currently being prepared for 2007.

Science:

- The Montreal Protocol is working. However, even if all governments fully comply with the Montreal Protocol, the ozone layer will remain particularly vulnerable during the next decade or so.
- The total combined effective abundance of ozone-depleting compounds in the lower atmosphere continues to decline slowly from the 1992-1994 peak. Total chlorine is declining, while bromine from industrial halons is still increasing, albeit at a slower rate than before. The abundances of HCFCs in the lower atmosphere are increasing.
- Observations in the stratosphere indicate that the total chlorine abundance is at or near its peak, while bromine abundances are probably still increasing.
- Springtime Antarctic ozone depletion due to halogens has been significant. In some recent cold Arctic winters during the last decade, maximum total column ozone losses due to halogens have reached 30%. Ozone remains depleted in the mid latitudes of both hemispheres.
- The global ozone layer recovery has been linked mainly to decreasing chlorine and bromine loading. A return to pre-1980 total column ozone amounts in the Antarctic is expected by the middle of this century. Although Arctic ozone depletion is difficult to predict, a future Arctic polar ozone hole similar to that of the Antarctic appears unlikely.
- The impact of very short-lived organic chlorine-, bromine-, and iodine-containing gases on stratospheric ozone can be significant if their emissions are large.
- Other factors such as climate change and changes in atmospheric transport are likely to influence the recovery of the ozone layer. New research has begun to explore the coupling between climate change and the recovery of the ozone layer.

Environmental Effects:

- New studies continue to confirm the adverse effects of UV-B radiation on the eyes, skin, and immune system, including cortical cataract and skin cancer.
- Phasing out the ozone-depleting chemical methyl bromide may lead to increased use of other pesticides, which result in additional health risks.
- Interactions between global climate change and ozone depletion are likely to influence the risk of adverse effects of UV-B radiation on health.
- Interaction of ultraviolet radiation with other global climate change factors may affect many ecosystem processes such as plant biomass production, plant consumption by herbivores including insects, disease incidence of plants and animals, and changes in species abundance and composition.
- Recent results continue to confirm the general consensus that solar UV negatively affects aquatic organisms (zooplankton, as well as larval stages of primary and secondary consumers).
- In addition to increasing solar UV-B radiation, aquatic ecosystems are confronted with other environmental stress factors including increased nutrient input, pollution, acidification and global climate change.
- Global warming and enhanced UV-B radiation interact to affect a range of biogeochemical processes including microbial activity, nutrient cycling, and greenhouse gas emissions from soils.

- Interactions between ozone depletion and climate change will have an impact on tropospheric hydroxyl (OH) radical concentration, the "cleaning" agent of the troposphere.
- Climate change is likely to modify the rates of UV-induced degradation of natural and synthetic materials.

Technology and Economics:

- The remaining 7,000 ODP tonnes of CFCs used annually in metered dose inhalers (MDIs) for asthma and chronic obstructive pulmonary disease (COPD) can be phased out. The timing is difficult to predict, but it depends on the availability of affordable alternatives and the adoption and effectiveness of transition strategies by Parties.
- In the last four years there has been a substantial phase-out of CFCs in non-MDI aerosols, and a complete phase-out for non-MDI aerosols is achievable. There are difficulties including the availability of hydrocarbon aerosol propellants, the conversion of small CFC users, and also the conversion of non-MDI pharmaceutical aerosols.
- Most miscellaneous uses have been phased out, while some laboratory uses still remain under a global exemption.
- The use of CFCs in foams has been reduced by over 90% since its peak in 1988, and HCFC use is also in decline from its peak in 2000. The phase-out of ozone-depleting substances in the foam sector has forced the industry to innovate faster than ever before. The first transition technology led to the introduction of substances such as HCFCs as well as to the increasing use of hydrocarbons and other ozone-safe chemicals. Attention is now focusing on emerging HFC-based technologies as well as on the further optimization and use of hydrocarbon and CO_2 technologies.
- Halon fire extinguishants are no longer necessary in virtually all new installations, with the possible exceptions of commercial aircraft and combat vehicles. The very high cost of replacing many existing halon systems with substitutesor other alternative fire-protection measures continues to be a major impediment to eliminating the continued use of halons.
- The production of methyl bromide for controlled uses was reported to be about 62,000 metric tonnes in 1998; it was reduced to at least 49,000 tonnes in 1999 and at least 28,400 tonnes in 2002. The decline in the total global consumption of methyl bromide is attributed largely to its reduced use for soil fumigation.
- With two exceptions (control of ginseng-root rot and the stabilization of high-moisture fresh dates), tcompleted demonstration projects have identified one or more alternatives for controlling targeted pests and diseases that are comparable to methyl bromide in their effectiveness.
- In the last decade, the refrigeration, air conditioning and heat-pump industries have made tremendous technical progress in phasing out CFCs and, in several applications, HCFCs as well. The mobile air conditioning and household refrigeration industries have shifted rapidly from CFC-12 to ozone-safe refrigerants. Other applications, such as chillers and commercial refrigeration, have shifted from CFCs to HCFCs, HFCs or other fluids. Worldwide, a significant amount of installed refrigeration equipment still uses CFCs and HCFCs. As a consequence, service demand for CFCs and HCFCs remains high.
- There is still much to be achieved in the solvents sector. Effort is still required to phase out ozone-depleting solvents in developing countries, especially by small- and medium-sized users. In particular, there is concern about the use of carbon tetrachloride for solvent applications by both large and small enterprises in some countries.

6. The Multilateral Fund of the Montreal Protocol and the GEF

The Multilateral Fund of the Montreal Protocol is part of the financial mechanism established under the Protocol in June 1990. It pays the agreed incremental costs incurred by developing countries in phasing out their consumption and production of ozone-depleting substances. It is administered by an Executive Committee of seven developed and seven developing countries chosen by the Parties every year. The Fund's allocation was $240 million for 1991-93, $455 million for 1994-96, $465 million for 1996-99 and $440 million for 2000-2. The replenishment for the three-year period 2003-5 was fixed at $474 million by the Parties at their Rome meeting in November 2002. The Multilateral Fund has thus far approved the disbursement of some 1.86 billion dollars for capacity building and projects to phase out ozone-depleting substances. This year the Parties will decide on the replenishment for the next period, 2006-8.

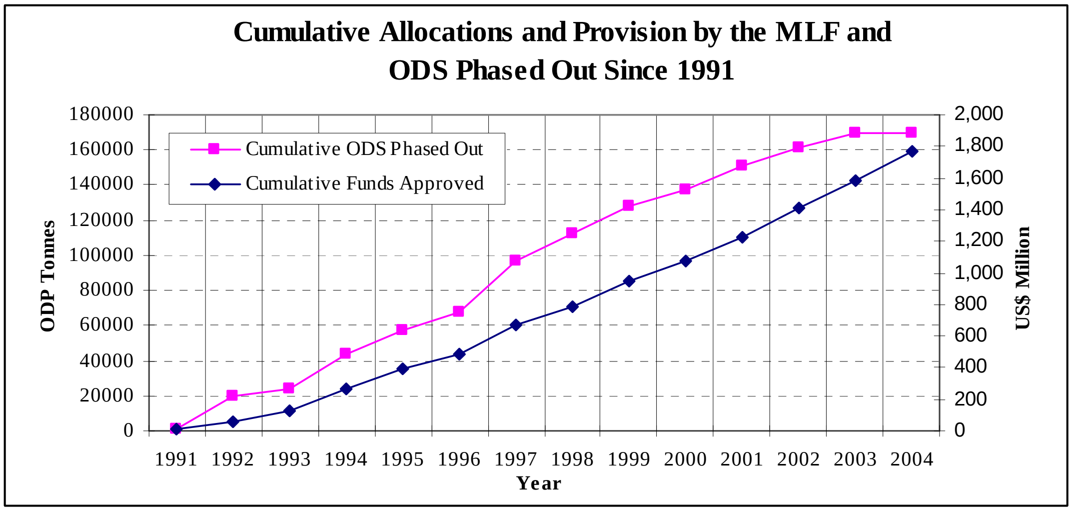

Figure 6 - Multilateral Ozone Fund: Cumulative Funds Approved and ODS Phased Out.

The Global Environment Facility (GEF) was established by the world community to help developing countries address ozone depletion, climate change, biodiversity and international waters. The GEF also supports projects and activities for phasing-out ozone-depleting substances in countries with economies in transition, as most of these Central and East European countries are not eligible for Multilateral Fund assistance. Between 1996 and 2000, GEF approved over $160 million to assist the following 17 countries: Azerbaijan, Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Russian Federation, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. Additional funds of $60 million have been ear-marked by GEF to assist these countries with the phase-out of HCFCs and Methyl Bromide.

7. Implementing Agencies of the Multilateral Fund and GEF

The UN Environment Programme, the UN Development Programme and the World Bank implement the programmes of the Fund and the GEF in developing countries and in countries with economies in transition. In addition, the UN Industrial Development Organization was included later as an additional implementing agency of the Fund.

UNEP is responsible for information exchange, institutional strengthening, networking and preparation of country programmes. It has assisted over 100 developing countries as well as countries that were formerly part of the Soviet Union.

UNDP, UNIDO and the World Bank are responsible for technical assistance and investment projects for phasing out ozone-depleting substances in all countries receiving assistance.

8. The Remaining Challenges

The Protocol has been hailed as an extraordinary success so far, but there is no room for complacency because:

Ratification is incomplete. Six countries have not yet ratified the Montreal Protocol, and many more have not yet ratified the London, Copenhagen, Montreal and Beijing Amendments.

Some countries with economies in transition have had difficulty complying with the Montreal Protocol. This is due to the economic recession and political transition since 1989. The Russian Federation and a few other countries admitted in 1996 that they would be unable to follow the phase-out time-table for CFCs. Many, however, managed to complete the phase-out by the year 2002. The Parties asked the GEF to provide this assistance, and it has thus far allocated over $160 million to these countries. In addition, the World Bank's Special Initiative raised $19 million from Austria, Denmark, Finland, Germany, Italy, Japan, Norway, Sweden, UK and US to close down the production of CFCs and Halons in the Russian Federation by the year 2000. The GEF has approved a further $60 million to assist these Parties with the phase-out of HCFCs and Methyl Bromide.

Illegal trade has increased. Although all new CFCs are now banned in industrialized countries, millions of CFC-dependent refrigerators, automobile air conditioners, and other equipment are still in service. Alternatives are available to service this equipment, but they can be more expensive. Recycled CFCs may be used to maintain existing equipment, but it is difficult to distinguish between new and recycled CFCs. In addition, while most consumption is forbidden, industrialized countries still produce some CFCs in order to meet their own essential uses and to supply developing countries, as permitted by the Protocol. Some traders illegally sell perhaps 20,000 tonnes of new CFCs in the industrialized countries every year in the guise of recycled substances or as exports to developing countries. Key drivers for illegal trade appear to be the continued demand for CFCs from developed countries to maintain CFC-dependent equipment after the total phase-out date, the cost associated with the replacement or retrofitting of CFC-dependent equipment, the absence or lack of enforcement of import and export controls, and the difficulty in distinguishing between new and used CFCs (the Protocol allows the continued import and export of used CFCs).

The potential for methyl bromide to be adopted in more applications and by more countries is worrying. Some countries imposed controls on this chemical because of its toxicity even before the concern about its role in ozone depletion first arose. Many countries have ratified the 1992 Copenhagen Amendment, which introduced controls on methyl bromide, resulting in considerable reductions. A number of developed countries, however, have requested exemptions for continued uses of methyl bromide after their 1 January 2005 phase-out deadline. In addition, the Copenhagen Amendment does not control quarantine and pre-shipment applications of methyl bromide, which was estimated to involve well over 11,000 tonnes in the year 2002. The recent adoption of standard 15 of the International Standards for Phytosanitary Measures of the International Plant Protection Convention of the Food and Agriculture Organization of the United Nations, which approves heat treatments and fumigation by methyl bromide for wood packaging to reduce the risk of introducing or spreading pests associated with wood packaging used in trade, further raises the potential for future increases in methyl bromide consumption in uncontrolled applications.

Atmospheric concentrations of Halons continue to increase even though production ended in 1994. This is because Halons in existing fire-fighting equipment get emitted whenever there is a fire. This is a concern because the bromine contained in Halons is 50 times more efficient than the chlorine in CFCs in depleting ozone. An expert panel continues to update the Parties on the implications of de-commissioning existing Halons systems and destroying the Halons they contain. Further work is aimed at ensuring new airplanes do not use Halons.

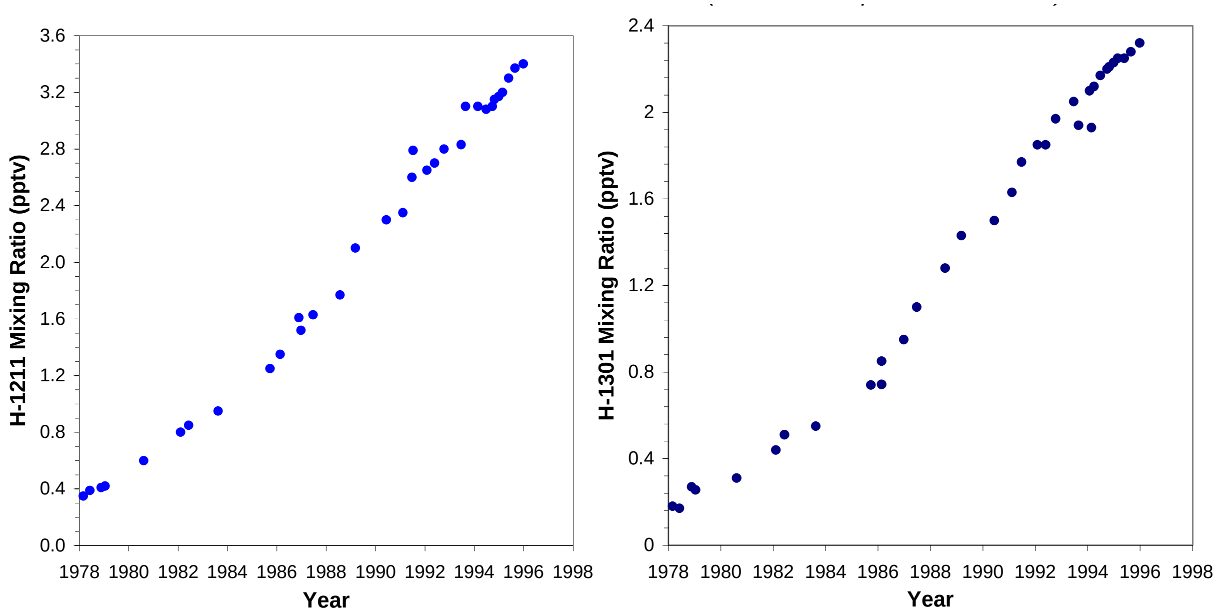

Figure 7 - Measured Atmospheric Concentration of Halons at Cape Grim, Tasmania.

Developing countries must implement their phase out of CFCs, Halons and carbon tetrachloride (CTC) according to the agreed schedule. Asian countries, in particular, have been increasing their consumption due to their high rates of economic growth. They must now reverse this by reducing CFC and halon consumption to less than 50% of their baseline, and CTC consumption to less than 85% of their baseline in 2005. While consumption levels in the developed countries – which had been much higher on both a per-capita and a national basis – have been virtually phased out, the Montreal Protocol can only succeed if the developing countries – with 80% of world population – phase out these substances despite their growing economies. The Multilateral Fund will continue to play an essential role in ensuring that this happens.

A great quantity of used CFC-dependent equipment (e.g. refrigerators and air-conditioners) is being exported to developing countries by countries that have phased out CFCs. These sales could make the future CFC phase-out by developing countries more difficult by stimulating a large demand for CFCs to maintain the equipment.

CFCs are being replaced, in part, by HFCs, which have a large global warming potential. The Kyoto Protocol on climate change has included HFCs in the basket of six gases whose emissions are to be reduced by the industrialised countries. Are the two global protocols sending confusing signals? Does the Kyoto Protocol hinder the implementation of the Montreal Protocol? The Parties to the Montreal Protocol as well as the Parties to the Climate Change Convention now have the reports of their scientific and technical panels on how to minimise the emissions of HFCs. Implementation of the panels' recommendations by governments is important.

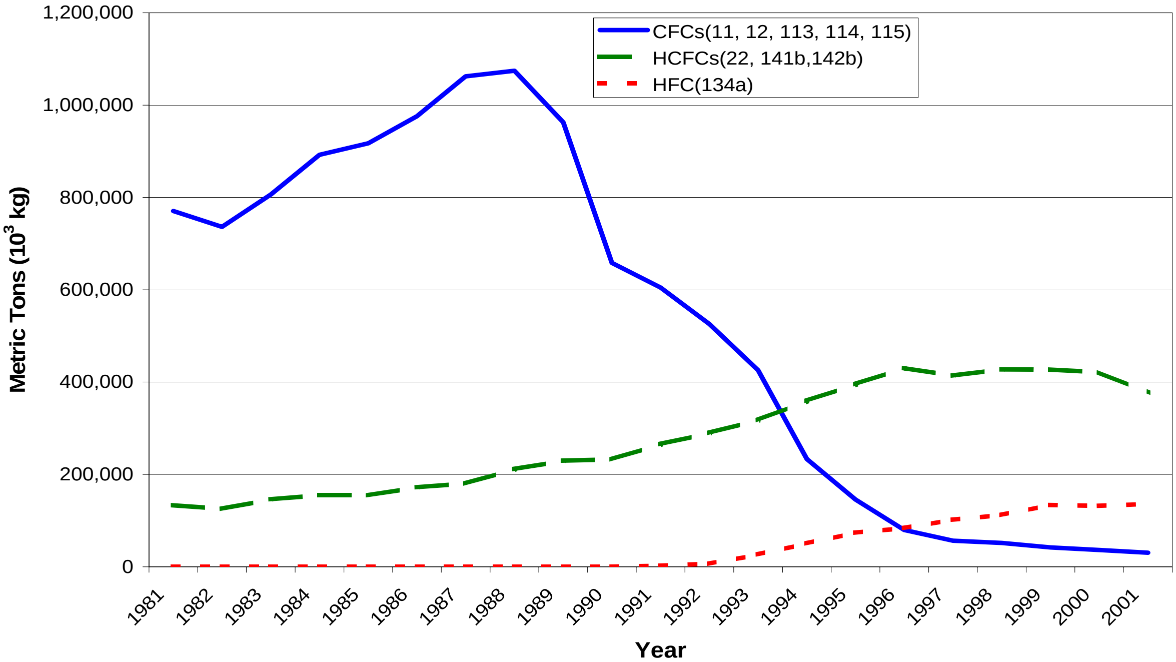

Figure 8 - Worldwide Production of CFCs, HCFCs and HFCs

9. Lessons of the Montreal Protocol

The Montreal Protocol offers many lessons that could be applied to solving other global environmental issues:

- Adhere to the "precautionary approach" because waiting for complete scientific proof can delay action to the point where the damage will become irreversible.
- Send consistent and credible signals to industry (e.g. by adopting legally binding phase-out schedules) so that they have an incentive to develop new and cost-effective alternative technologies.
- Ensure that improved scientific understanding can be incorporated quickly into decisions about the provisions of a treaty.
- Promote universal participation by recognizing the "common but differentiated responsibility" of developing and developed countries and ensuring the necessary financial and technological support to developing countries.
- Control measures should be based on an integrated assessment of science, economics, and technology.

10. Note to Journalists

This backgrounder was updated in November 2005. Official documents and other information is available via the Internet at **http://www.unep.org/ozone** or at **http://www.unep.ch/ozone**. The Ozone Secretariat is based in Nairobi. For interviews or additional information, contact:

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