



G lobal Stewardship

Environmental Sustainability Indicators~Technical Report

Introduction

Environmental sustainability can only be realized if there is cooperation with other countries to manage common environmental problems. Stewardship is the commitment to responsible management of world resources through leadership. Responsibility is shown in participating internationally in global programmes aimed at addressing biophysical, social, economic and institutional issues that go beyond the country's borders.

Ability to Respond to Global Stewardship Collectively

The ability of a country to respond to the need for global stewardship of the environment is important in dealing with transboundary and global environmental issues.

Managing common environmental problems together can lead to greater commitment and effort. South Africa hosted the World Summit on Sustainable Development (WSSD) in September 2002. Agreements from this Summit include the Johannesburg Declaration and the Johannesburg Plan of Implementation (JPOI). The JPOI contains 37 time-bound targets, inclusive of the internationally agreed development goals of the Millennium Declaration.

South Africa has already taken a number of steps towards responding to these targets, and is in the process of conceptualizing and developing a coherent national strategy which would voice our commitment in the global community.

The indicators and variables representing our ability to respond to global stewardship collectively are:

- **Greenhouse gas emissions**
 - Carbon emissions per capita

- **Participation in international collaborative efforts**
 - Multilateral environmental agreements

- **Reducing transboundary environmental pressures**
 - Production and consumption of CFCs
 - Transfrontier conservation areas (TFCAs)

For further information on the global stewardship please refer to the following:

Department of Foreign Affairs, 2005. The South African Treaty Index.

United Nations Environment Programme 2004. *Global Environment Outlook 3*. <http://www.unep.org/geo/>

United Nations Environment Programme 2002. *Africa Environment Outlook*. <http://www.unep.org/dewa/Africa>

United Nations Environment Programme 2006. *Africa Environment Outlook 2*. Our Environment, Our Wealth. <http://www.unep.org/dewa/Africa>

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Indicator: Greenhouse gas emissions

Variable: 42

Description: Carbon emissions per capita

Units: Metric tons of carbon emissions per capita.

Source: United Nations Statistical Division. Initial National Communication under the United Nations Framework Convention on Climate Change (UNFCCC).

Change Your Carbon Footprint. <http://changeyourcarbonfootprint.co.za/www.changeyourcarbonfootprint.co.za>

Logic: Emissions of carbon dioxide contribute to climate change. All countries emit carbon dioxide, but the amount per person varies considerably.

Discussion: The highly energy-intensive South African economy makes the country one of the highest emitters of greenhouse gasses in Africa, and it stands above the Organization for Economic Co-operation and Development (OECD)^a region average in energy sector emissions. While South Africa produces more than 40% of Africa's fossil fuel-related carbon dioxide (CO₂) emissions, it is responsible for only about 1.6% of the world's total emissions (ranking it 12th in the world in 2000). Most of South Africa's CO₂ emissions are from use of coal, and overall, CO₂ emissions have increased by about 30% over the last decade. In 2000, South Africa was the 19th most carbon-intensive economy, measuring kg CO₂ / 95\$ PPP (International Energy Agency (IEA) 2002). South African per capita emissions are higher than those of many European countries, and more than 3.5 times the average for developing countries. Reliance on coal energy sources is the main reason behind South Africa's high emissions profile. Coal-related sources of greenhouse gasses (GHGs) in South Africa include electricity generation and the production of synthetic liquid fuels, and energy-intensive industries such as mining, iron and steel, aluminium, ferrochrome and chemicals – the same sectors that make up a large share of South African exports. Other major emission sources include oil refining, coal mining and gas extraction, wood burning, and the burning of coal and oil to produce heat.

Limitations: The South African Greenhouse Gas Inventory only shows information for 1990 and 1994 and is due to be updated. For per capita emissions, data from other sources have to be used in the interim.

Notes: a) Organization for Economic Co-operation and Development

This indicator links directly to Output 2 of the Delivery Agreement for Outcome 10.

Table 33: Carbon emissions (1990–2006)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Emissions per capita (metric tons)	9.1	9.2	8.4	8.7	8.9	8.5	8.5	8.6	8.5
Emissions thousand metric tons	333 531	346 353	324 870	342 569	358 948	353 481	358 666	371 353	372 244
	1999	2000	2001	2002	2003	2004	2005	2006	
Emissions per capita (metric tons)	8.3	8.1	7.9	7.5	8.1	8.7	8.5	8.6	
Emissions thousand metric tons	371 059	368 636	362 769	347 714	380 908	415 334	409 090	414 649	

Source: UN Statistical division: <http://mdgs.un.org/unsd/mdg>

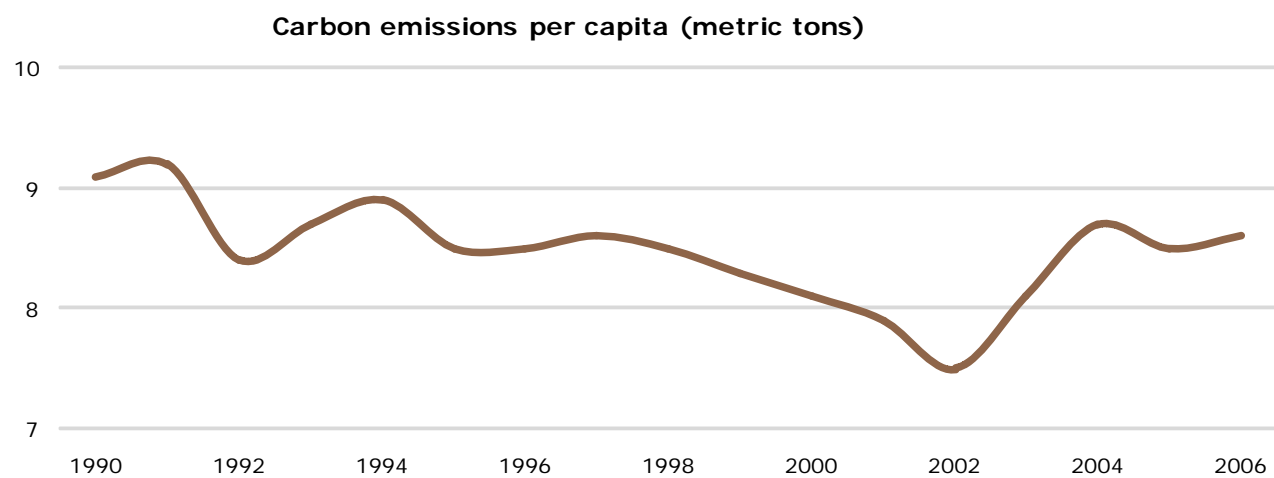


Figure 48: Total carbon emissions per capita in metric tons

Source: United Nations Statistical Division

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Indicator:	Participation in international collaborative efforts
Variable:	43
Description:	Multilateral environmental agreements
Units:	Number of agreements signed and in-force.
Source:	Department of Environmental Affairs and Tourism (DEAT) 2006. <i>South Africa Environment Outlook</i> . A report on the state of the environment. Department of Environmental Affairs and Tourism, Pretoria. Environmental Treaties and Resource Indicators. http://sedac.ciesin.org South African Cyber Treaty Series. http://www.earthlink.net
Logic:	Multilateral environmental agreements promote the protection of the environment through the individual and collaborative efforts. South Africa's ratification of these agreements demonstrates the country's support for international treaties as well as efforts to manage common environmental resources.
Discussion:	The list of multilateral environmental agreements provides an indication of priority environmental issues for South Africa. The table can be used to understand where the greatest focus lies and those areas where South Africa has a weak policy approach. South Africa is signatory to a number of additional environmental agreements and treaties. These can be viewed on the Environmental Treaties and Resource Indicators website: http://sedac.ciesin.org
Limitations:	Participation in international agreements should go beyond the becoming signatures to treaties. Aspects such as participation and compliance with treaty obligations are currently not measured.
Notes:	This indicator seeks to address the Johannesburg Plan of Implementation: Section 19.

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Table 34: Examples of multilateral environmental agreements signed

Multilateral Environmental Agreement	Status ^a
Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks	Ratified: June 2003 (acceded)
Agreement on the Conservation of Albatrosses and Petrels	Signed and ratified: 6 November 2003
Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)	Acceded to and ratified by May 1994; came into force: 3 August 1994
United Nations Framework Convention on Climate Change	Signed: 15 June 1993, 27 August 1997 (although DEAT submission to parliament indicates 1994)
	Ratified: 29 August 1997
	Kyoto Protocol: acceded to in July 2002
Convention on Biological Diversity	Ratified: 2 November 1995. Biosafety Protocol currently under debate.
United Nations Convention to Combat Desertification	Acceded to: June 1994; signed: 1995; ratified: 30 September 1997
Convention on International Trade in Endangered Species of Wild Life and Fauna	Ratified: 1973; came into force: October 1975
Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade or the 'Rotterdam Convention'	Signed: September 1998; ratified: 4 September 2002
Convention on the Conservation of Antarctic Marine Living Resources	Acceded to: September 1980; ratified: 1982
Protocol for the Protection of the Ozone Layer (Montreal Protocol)	Acceded to: 15 January 1990; ratified: 15 January 1990 (the Montreal Amendments to the Protocol (1997) have yet to be ratified)
Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the East and Central African Region and related Protocol (Abidjan Convention)	Ratified: 5 November 2002 (acceded)
Convention for the Protection, Management and Development of the Marine and Coastal Environment of the East African Region and related Protocols (Nairobi Convention)	Ratified: 5 November 2002 (acceded)
Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention)	Ratified: 10 July 1997
Stockholm Convention on Persistent Organic Pollutants	Signed: 21 May 2001; ratified: 4 September 2002
Southern African Developing Countries Protocol on Fisheries	Signed: 14 August 2001; ratified: July 2003
Southern African Developing Countries Protocol on Wildlife Conservation and Law Enforcement in the Southern African Development Community	Signed: 18 August 1999; ratified: October 2003
Transfrontier Conservation Areas Initiative	
- Ai- Ais/Richtersveld Treaty	Signed and ratified: 1 August 2003
- Kgalagadi Transfrontier Park Agreement	Signed and ratified: 12 May 2000
- Greater Limpopo Transfrontier Park Treaty	Signed and ratified: 9 December 2002
- Lubombo Transfrontier and Resource Area (Lubombo Protocol)	Signed and ratified: 22 June 2000

a) When a government representative signs an international convention on behalf of the country, a State becomes party to that convention. The convention is later ratified by the government, which signifies agreement to be bound by the convention. If the state does not sign the convention when it was open for signature, but later formally agrees to be bound by the convention, a government accedes to the convention.

Source: Environmental Treaties and Resource Indicators. <http://sedac.ciesin.org>

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Table 35: Numbers of agreements signed and in force

International environmental agreements by subject	Agreements signed	Agreements in force (party to)
Soil quality/ pollution	0	3
Water quality/ pollution	0	1
Water resources conservation/ management	1	1
Seawater quality/ pollution	0	26
Marine resources conservation/ management	1	11
Sea navigation	0	7
Sea jurisdiction	0	4
Air	0	9
Plant species protection/ management	3	13
Control of plants considered pests/ diseases	0	2
Maintenance of thickets/ groups of trees	0	1
Forest conservation/ management/ exploitation	1	0
Animal species protection/ management	2	16
Control of animals considered pests/ diseases	0	3
Hunting/ management/ use of harvestable species	0	3
Fishing/ management/ use of harvestable fish	0	10
Hazardous substances	1	20
Radiation	2	12
Non renewable resources use/ mining	0	4
Land use and land use planning	0	2
Atmosphere/ climate/ outer space	1	7
Wastes (general)	1	12
Noise	0	2
Renewable energy sources and energy conservation	1	2
Protected areas	0	9
Legal and Institutional Questions	3	11
Natural resources and nature conservation	0	9
Environmental conservation (general)	1	5

Source: Environmental Treaties and Resource Indicators. <http://sedac.ciesin.org>

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Indicator: Reducing transboundary environmental pressures

Variable: 44

Description: **Production and consumption of CFCs**

Units: Ozone Depleting (ODP) tons.

Source: United Nations Environment Program (UNEP) Ozone Secretariat.

Department of Environmental Affairs (DEA): State of the Environment Internet Portal. <http://soer.deat.gov.za>

Logic: This variable shows South Africa's production and consumption of ozone depleting substances. Ozone depleting substances are controlled through the Montreal Protocol on Substances that deplete the ozone layer. Ozone depleting substances are causing a thinning in the stratospheric ozone layer. An increase in ozone concentrations in the atmosphere and more radiation reaching the earth have negative impacts on human health and ecosystem functioning. The Montreal Protocol was agreed upon in 1987 at the Headquarters of the International Civil Aviation Organization. This protocol aims to halve the consumption of the main chlorofluorocarbon (CFC) gasses in relation to the 1986 figures and later to ban them entirely.

Discussion: Stratospheric ozone depletion is an international issue. However the impacts of stratospheric ozone depletion are of more significance on a local scale. South Africa was a signatory to the Montreal Protocol (controlling the use of ozone-depleting substances for the protection of the ozone layer) in 1990 and subsequently ratified the London Amendments (restriction of the use of CFCs and halons) in 1992. Future predictions show that the period of greatest ozone depletion is to be expected in the next two decades. Stratospheric ozone depletion is responsible for a wide range of impacts, including impacts on human health such as cataracts and melanomas. South Africa has almost completely phased out the use of ozone-depleting substances such as CFCs and carbon tetrachloride, and stopped using ozone-depleting CFCs in aerosol spray-can propellants as far back as July 1992. However, a small amount of legal CFCs are imported and exported to fill asthma inhalers as well as air conditioners and refrigerators manufactured before 1996. The CFC methyl bromide (used as a pesticide in the agricultural sector) is still being imported and used. Consumption of ozone-depleting substances in South Africa^a, weighted according to the ozone-depleting potential of each substance (expressed in ODP tons), were reduced by more than 96% during the period 1986-2005. This is mainly a result of reduced imports of halons and CFCs. Hydro-CFC's are to be phased out by 2040 and methyl bromide (used in pesticides) is to be phased out by 2015.

The variable signifies the commitment to progress in phasing out the consumption of CFCs by countries that have ratified the Montreal Protocol. The Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol (1987) are now recognized as having been successful in preventing the global environmental catastrophe that could have been caused by stratospheric ozone depletion. The Montreal Protocol aims to reduce and eventually eliminate the emissions of anthropogenic ozone-depleting substances by ceasing their production and consumption.

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The phasing out of ozone-depleting substances and their replacement with less harmful substances or new processes are aimed at the recovery of the ozone layer. CFCs are considered most representative of the protocol's efforts towards phasing out the use of ozone-depleting substances because they were the first to be targeted for elimination.

Notes: a) Consumption of Ozone Depleting CFCs is the sum of the consumption of the weighted tons of the individual substances in the group-metric tons of the individual substance (defined in the Montreal Protocol on Substances that Deplete the Ozone Layer) multiplied by its ozone-depleting potential. Ozone-depleting substances are any substance containing chlorine or bromine that destroys the stratospheric ozone layer. The stratospheric ozone absorbs most of the biologically damaging ultraviolet radiation. The consumption of CFCs is the national production plus imports, minus exports, minus destroyed quantities, minus feedstock uses of individual CFCs. National annual consumption of CFCs is the sum of the weighted tons (consumption in metric tons multiplied by the estimated ozone-depleting potential) of the individual CFCs.

This indicator links directly to Output 2 of the Delivery Agreement for Outcome 10.

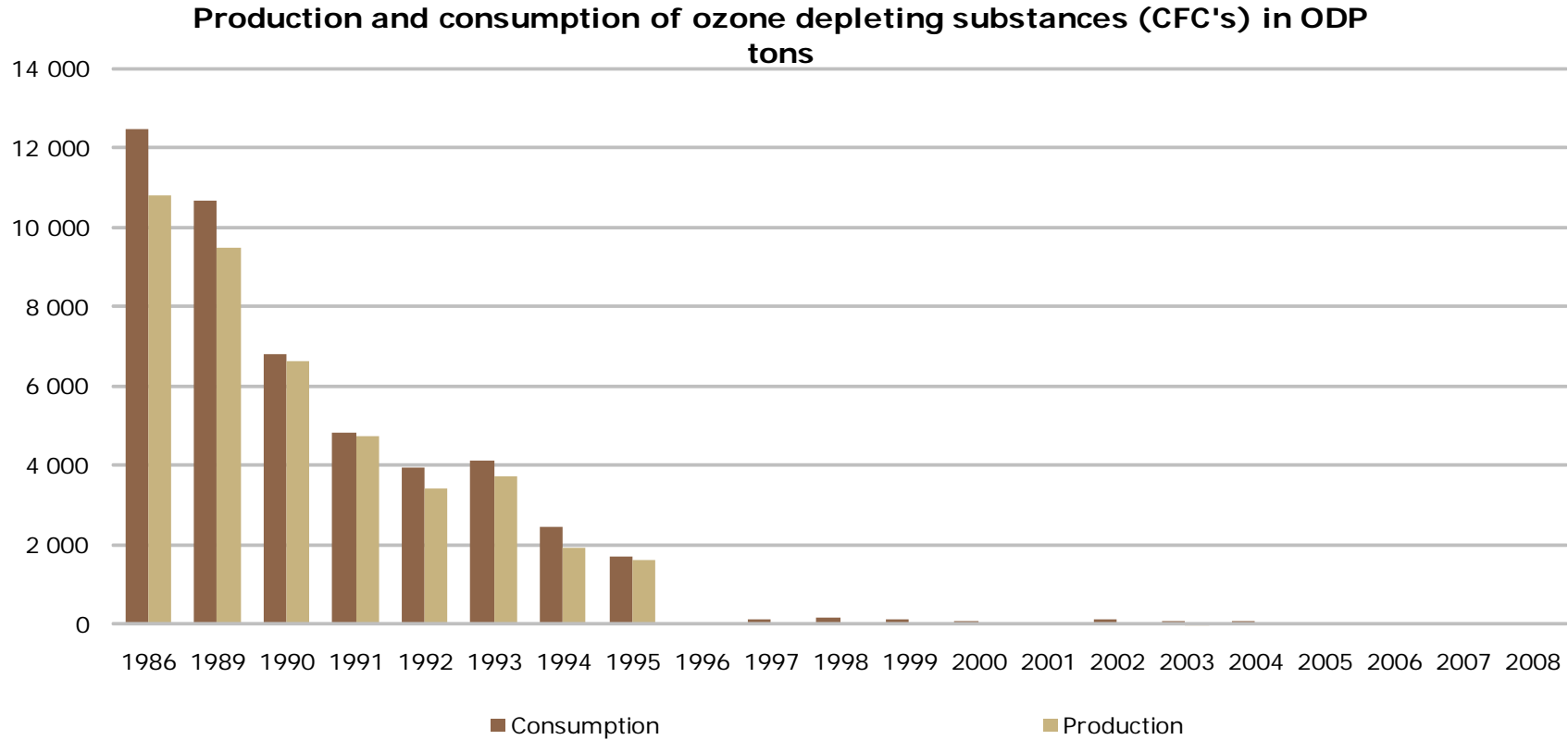


Figure 49: Production and consumption of ozone depleting substances (CFCs) in South Africa (1986–2008)

Source: UNEP Ozone Secretariat.<http://ozone.unep.org/Data Access/>

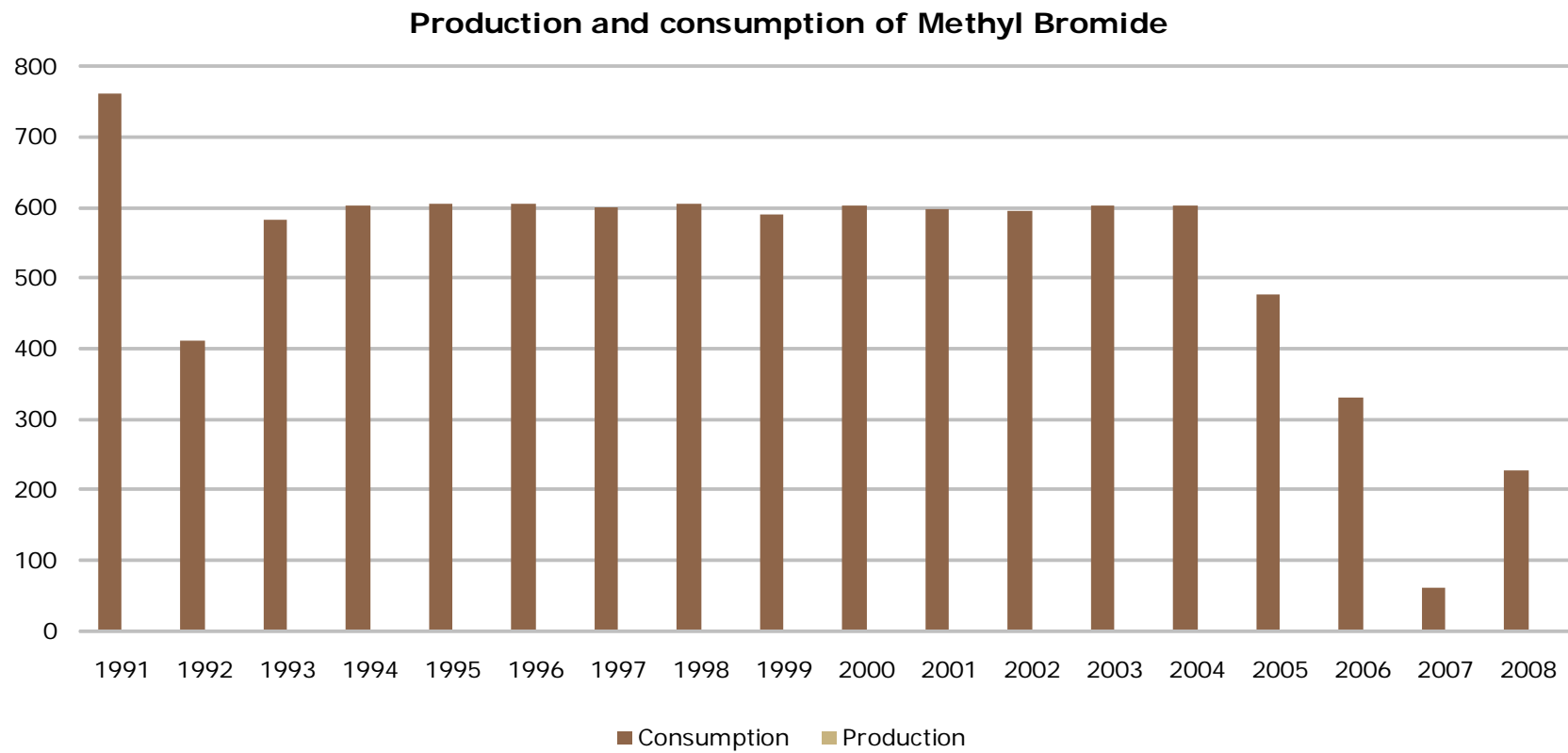


Figure 50: Production and consumption of Methyl Bromide in ODP tons (1986–2008)

Source: UNEP Ozone Secretariat. <http://ozone.unep.org/Data Access/>

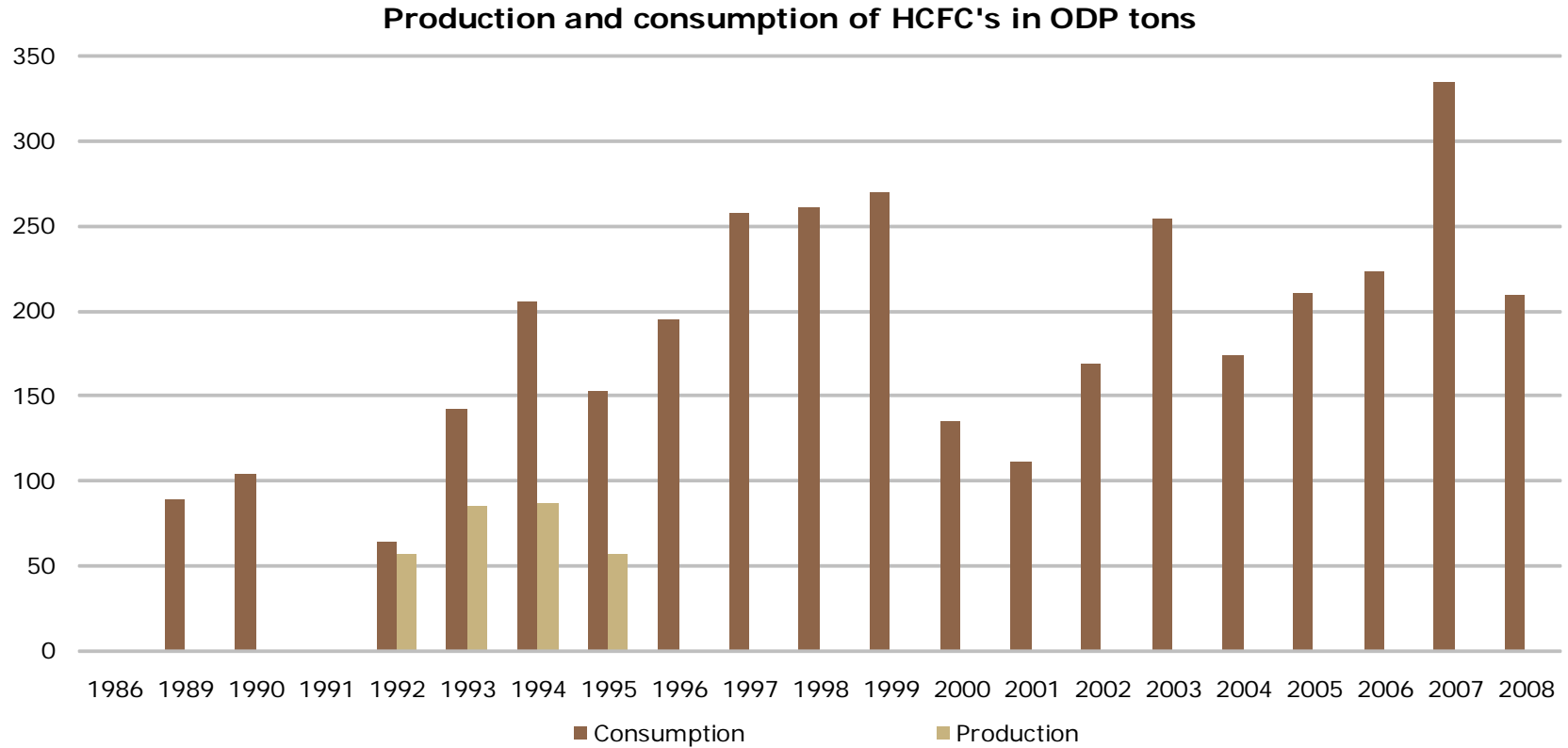


Figure 51: Production and consumption of HCFC's in ODP tons (1986–2008)

Source: UNEP Ozone Secretariat.<http://ozone.unep.org/Data Access/>

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Table 36: Consumption of ozone depleting substances in ODP tons for South Africa

Anx	Group	Name	1986	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
A	I	CFCs	12 449.0	10 656.0	6 804.5	4 795.3	3 951.4	4 127.4	2 416.6	1 679.6	0.0	98.3	155.1
A	II	Halons	6 222.0	3 807.0	1 264.0	1 121.0	5 372.0	1 059.0	0.0	0.0	0.0	0.0	0.0
B	I	Other Fully Halogenated CFCs	-	666.9	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B	II	Carbon Tetrachloride	-	8 919.5	10 104.5	-	82.5	134.2	53.9	0.0	0.0	0.0	0.0
B	III	Methyl Chloroform	-	450.0	450.0	450.0	448.8	362.0	113.7	60.3	0.0	0.0	0.0
C	I	HCFCs	-	89.2	103.3	0.0	63.4	142.2	205.1	152.5	194.3	256.9	260.8
C	II	HBFCs	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	III	Bromochloromethane	-	-	-	-	-	-	-	-	-	-	-
E	I	Methyl Bromide	-	-	-	759.0	409.8	580.8	601.2	604.2	604.2	598.5	604.0
Anx	Group	Name	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Baseline
A	I	CFCs	117.3	80.5	16.0	86.6	60.8	61.8	30.0	0.0	0.0	0.0	592.6
A	II	Halons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0
B	I	Other Fully Halogenated CFCs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B	II	Carbon Tetrachloride	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B	III	Methyl Chloroform	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	I	HCFCs	269.7	134.7	111.1	168.4	253.7	173.1	209.9	222.6	335	209.2	-
C	II	HBFCs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	-
C	III	Bromochloromethane	-	-	-	0.0	14.4	36.0	20.8	0.0	0	0.0	-
E	I	Methyl Bromide	588.1	600.1	596.5	593.8	600.7	601.2	476.2	330	60	225.9	602.7

Source: UNEP Ozone Secretariat. <http://ozone.unep.org/Data Access/>

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Table 37: Production in ODP tons for South Africa

Anx	Group	Name	1986	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
A	I	CFCs	10 800.0	9 500.0	6 639.0	4 748.0	3 437.0	3 722.0	1 947.0	1 627.0	0.0	0.0	0.0
A	II	Halons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B	I	Other Fully Halogenated CFCs	-	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B	II	Carbon Tetrachloride	-	12 697.3	10 264.1	-	7 139.0	4 774.0	6 340.4	4 931.3	0.0	0.0	0.0
B	III	Methyl Chloroform	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	I	HCFCs	-	0.0	0.0	0.0	56.5	84.5	87.0	56.8	0.0	0.0	0.0
C	II	HBFCs	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	III	Bromochloromethane	-	-	-	-	-	-	-	-	-	-	-
E	I	Methyl Bromide				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anx	Group	Name	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Baseline
A	I	CFCs	0.0	0.0	0.0	0.0	0.0	-1.0	0.0	0.0	0.0	0.0	542.3
A	II	Halons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B	I	Other Fully Halogenated CFCs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B	II	Carbon Tetrachloride	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B	III	Methyl Chloroform	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	I	HCFCs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
C	II	HBFCs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
C	III	Bromochloromethane	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
E	I	Methyl Bromide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: UNEP Ozone Secretariat. <http://ozone.unep.org/Data Access/>

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Indicator: Reducing transboundary environmental pressures

Variable: 45

Description: **Transfrontier Conservation Areas (TFCAs)**

Units: Area covered by Transfrontier Conservation Areas and the countries involved in the transboundary partnerships.

Source: Department of Environmental Affairs (DEA).

Logic: Transfrontier Conservation Areas is a good indicator of a country's ability to work in partnership with other countries with the goal of conserving biodiversity.

Discussion: A Transfrontier Conservation Area (TFCA) is defined as a cross border region comprising of different component areas that have different forms of conservation statuses. These areas can comprise national parks, private game reserves, communal natural resource management areas and hunting concession areas. The Department of Environmental Affairs has developed a focused Transfrontier Conservation Area (TFCA) programme, in partnership with neighbouring countries to establish conservation areas at a large-scale. Benefits from this programme include the conservation of biodiversity and ecosystem functioning and functions. Conservation of ecosystem functions include the re-establishment of seasonal migrational routes of wildlife. Linkages between conservation and economic developments are encouraged through cross-border tourism, infrastructure development and the sustainable use of natural resources.

There are six Transfrontier Conservation Areas (TFCAs) and respective countries involved are:

- |Ai-|Ais/Richtersveld TFCA - South Africa, Namibia
- Great Limpopo TFCA - South Africa, Mozambique, Zimbabwe
- Kgalagadi TFCA - South Africa, Botswana
- Limpopo-Shashe TFCA - South Africa, Botswana, Zimbabwe
- Lubombo TFCA - South Africa, Mozambique, Swaziland
- Maloti-Drakensberg TFCA - South Africa, Lesotho

Besides the TFCA's there are also Transfrontier Conservation Parks. These parks are defined as an area comprising of two or more areas that border each other across international boundaries with the primary focus being wildlife conservation. The first establishment development and management of such a Transfrontier Conservation Area was the Kgalagadi Transfrontier Park. This park was established on the 7th April 1999. Since its inception five more Transfrontier Conservation Areas have been established up to 2008.

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Limitations: It should be noted that the establishment of a Transfrontier Conservation Area/Park is a complex process and involves various cross-cutting issues between different countries.

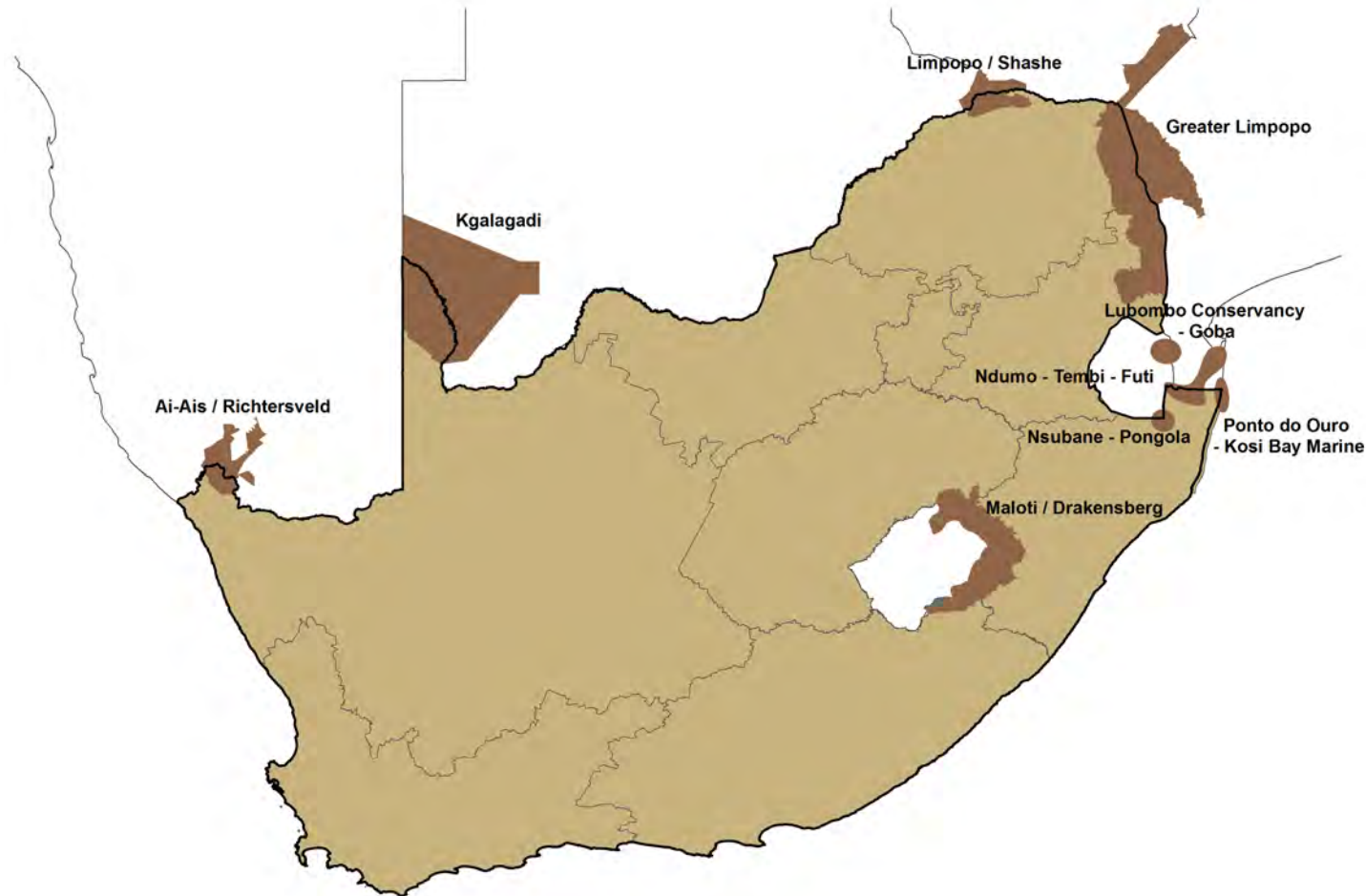


Figure 52: Distribution of Transfrontier Conservation Areas in South Africa and neighbouring countries

Source: Department of Environmental Affairs (DEA)

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Table 38: Transfrontier Conservation Area names and information regarding establishment date, area currently occupied and bordering countries

Park name	When established	Area	Area in South Africa	Bordering Countries
!Ai-!Ais/Richtersveld	2001	6 222 km ²	1 902 km ² (31%)	Namibia
Kgalagadi	1999	37 991 km ²	9 591 km ² (27%)	Botswana
Limpopo-Shashe	2006	4 872 km ²	2 561 km ² (53%)	Botswana and Zimbabwe
Great Limpopo	2002	35 000 km ²	20 000 km ² (57%)	Mozambique and Zimbabwe
Lubombo	2002	4 195 km ²	1 095 km ² (26%)	Swaziland and Mozambique
Maloti-Drakensberg	2001	8 113 km ²	2 943 km ² (36%)	Lesotho

Source: Department of Environmental Affairs (DEA)

When one tugs at a single thing in nature, he finds it
attached to the rest of the world.
~John Muir