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Environment Statistics - 2000

Introduction

This issue of the Economic and Social Indicators presents a new series of statistics that have been compiled by the Central Statistics Office (CSO) jointly with the Department of Environment of the Ministry of Environment. The present indicator has drawn information from various institutions and thus some of the data may already be available in other publications. In most of the tables comparative data are provided for 1990, 1995 and 2000 and, unless otherwise stated, relate to the Republic of Mauritius.

1. The economy

Economic and social activities place a variety of stresses on the environment. In order to show the structural changes that have occurred during the last decade, some key socio-economic indicators are given in Table 1.1.

From 1990 to 2000 Gross Domestic Product (GDP), which measures the total value of production in a particular year, has in nominal terms increased by about threefold from Rs 39,629 million to Rs 118,478 million. The share of agriculture in GDP dropped from 12.8% in 1990 to 6.7% in 2000, that of manufacturing has decreased marginally from 24.2% to 23.8% while that of financial and business services increased from 14.4% to 18.1%.

During the same period the population increased by 11.6 % from 1,056,800 in 1990 to 1,179,100 in 2000, and the population density from 518 to 578 per km².

2. Agriculture

2.1 Land use

Urbanisation and the development of industries and infrastructure have led to a loss of agricultural land. Detailed data on land use for the island of Mauritius are available only for 1986 and 1995.

Between 1986 and 1995, the proportion of land under agriculture dropped from 48.2% to 46.4%, and that of forestry from 35.1% to 30.6% whilst built-up areas increased from 13.4% to 19.5% (Table 2.1 and figure 1).

Preservation of forests is vital for the protection of the ecosystem. Table 2.2 shows the forest area by category. In 2000 total forest area was 56,629 hectares, of which: state-owned (22,089 hectares) and privately-owned (34,540 hectares).

As shown in Table 2.3, around 90% of our agricultural land is under sugarcane plantation with the remainder being occupied by foodcrops, tea and tobacco.

2.2 Fertiliser and other inputs

Intensive use of chemical based fertilisers and other agro-chemicals may contribute to the pollution of the environment through the leaching of nitrate to ground water. The total amount of fertilisers consumed and its breakdown by main nutrient components are shown in Table 2.4. The consumption of fertilisers for the year 2000 amounted to 67,044 tonnes, showing a decrease of 1,503 tonnes (-2.2%) over 1990. The nutrient contents consisted of nitrogen, phosphate and potash with respective proportions of 17.2 %, 5.9 % and 20.0 % of the product weight.

3. Energy

While being an essential ingredient for the economic development and for the well being of the population, energy-related activities are also a source of major concern for the environment. They are by far the most important contributors of air pollutants, through the emission of carbon dioxide and other greenhouse gases.

3.1 Primary energy requirements

Between 1990 and 2000, the total primary energy requirement of the country rose by 58.7%, from 734 ktoe (thousand tonnes of oil equivalent) to 1,165 ktoe. This is equivalent to an annual growth rate of 4.7%. Details on the primary energy requirements by energy source are shown in Table 3.1. In 2000, around 77% of the total primary energy requirement was met by imported fuels (oil, LPG and coal) and the remaining 23%, from local sources (bagasse and hydro).

3.2 Inputs for electricity production

Table 3.2 shows the different types of fuel used for electricity production expressed in energy units . Fuel oil, which represented 59% of total energy used in 1990, dropped to 39% in 2000. Consequently, a considerable rise in the use of coal and bagasse is noted in 2000 due to the production of electricity by the Independent Power Producers (IPPs) of the sugar industry.

3.3 Final energy consumption

In 2000, final energy consumption amounted to some 1,049 ktoe. The largest consumers were the transport and manufacturing sectors which accounted for 37% and 34% of the total consumption respectively. Between 1990 and 2000, final energy consumption increased on average by 4.2% per annum (Table 3.3 and figure 2).

4. Transport

Industrialisation, continuous economic growth and higher standard of living have led to a rapid increase in transport services over the recent years. A number of environmental problems are associated with transport, especially emission of carbon dioxide and other pollutants such as nitrogen oxide, volatile organic compounds, sulphur dioxide and particulates.

4.1 Stock of registered motor vehicles

The fleet of motor vehicles has nearly doubled between 1990 and 2000 from 123,545 to 244,018 (Table 4.1). This expansion has been accompanied by a similar growth in energy consumption and carbon dioxide emission in the transport sector.

In 2000, about 390 ktoe of energy were used for transportation; of which gasoline 115 ktoe, diesel oil, 161 ktoe and aviation fuel, 112 ktoe. Between 1990 and 2000 consumption of gasoline and diesel oil rose by 80% and 109% respectively. (Table 4.2).

5. Greenhouse gas (GHG) emissions

Mauritius as a party to the United Nations Framework Convention on Climate Change (UNFCCC) is required to update and report periodically on the inventory of anthropogenic emissions and removal of greenhouse gases using IPCC (Intergovernmental Panel on Climate Change) guidelines. GHG are gases occurring naturally and resulting from human activities which act much like a glass greenhouse, trapping heat in the lower levels of the atmosphere and reflecting the heat back to the earth's surface, causing it to heat up. Data on GHG emissions and removals have been compiled as from the year 1990.

Table 5.1 shows the total emissions and removals of greenhouse gases for the years 1990, 1995 and 2000. The data indicate a rise of nearly 215% in net CO₂ emissions from 748 thousand tonnes in 1990 to 2,357 thousand tonnes in 2000. Net emissions take into account the removal of CO₂ by forests. However, the contribution of Mauritius to the greenhouse effect remains negligible as, on the global scale, CO₂ emissions are currently estimated to range between 5.7 and 6.9 billion tonnes (carbon) per annum.

5.1 Carbon dioxide emissions from fossil fuel by sector

Between 1990 and 2000, total carbon dioxide emissions from fossil fuel more than doubled from 957 Gg to 2580 Gg. Emissions from electricity production industries, manufacturing industries, transport and residential sectors increased by 244%, 93%, 138% and 142% respectively. Carbon dioxide from energy industries alone contributed to 1,185 Gg (46 %) of the total emissions in 2000, followed by transport with 835 Gg (33 %). (Table 5.2)

5.2 Greenhouse gas inventory

The national inventory of greenhouse gas emissions by source categories for the year 2000 is given in Table 5.3. Carbon dioxide (CO₂), with an emission of 2,583 Gigagram (Gg), was the major greenhouse gas injected in the atmosphere. Most of this gas was produced as a result of fuel combustion activities such as electricity production, transport and manufacturing processes. Other GHG injected were carbon monoxide (79.9 Gg), sulphur dioxide (29.4 Gg), non-methane volatile organic compounds (18.5 Gg), oxides of nitrogen (14.8 Gg), methane (5.7 Gg) and nitrous oxide (1.4 Gg).

6. Water

6.1 Water balance

The estimated water balance for Mauritius is shown in Table 6.1. The water balance is based on long term records of annual average rainfall and indicates how fresh water resources are distributed. On average, the island of Mauritius receives 3,900 million cubic metres (Mm³) of precipitation (rainfall) every year. Some 30% of this water is lost through evapotranspiration, while surface runoff and ground water recharge account for 60% and 10% respectively.

6.2 Water utilisation

Estimates of water utilisation for the year 2000 are shown in Table 6.2. The water demand was estimated at 982 Mm³ of which, 468 Mm³ (48%) were used for irrigation, 305 Mm³ (31%) for hydropower and 209 Mm³ (21%) for domestic and industrial purposes.

Around 85 % of the total water demand was met by surface water and the remaining 15 %, by ground water.

7. Waste

The rapid economic development of Mauritius has led to changes in the production and consumption pattern resulting in an increased volume of waste being generated. For the efficient management of waste, data are required on the different types of waste being generated. Unfortunately, there is a paucity of time series data on waste and the only data available relate to Mare Chicose landfill site, the major recipient of solid wastes.

7.1 Waste disposal

Increasing waste generation and consequently its disposal pose a major environmental problem. Waste collected are either sent directly to the Mare Chicose

Sanitary Landfill which started operating by the end of 1997 or go through the process of compaction at the four transfer stations (St Martin, Roche Bois, Poudre D'Or and La Brasserie) before their transportation to the landfill site.

The total amount of solid waste landfilled at Mare Chicose in 1999 was 180,788 tonnes while that in 2000 stood at 265,817 tonnes, representing an increase of 85,029 tonnes (47%). (Table 7.1 and figure 3).

8. Environmental Impacts Assessment (EIA) Licences and complaints

The Department of Environment grants EIA licences as from the end of 1993, for undertakings (projects) which have an impact on the environment or on human health. These undertakings are listed in the First Schedule of the Environment Protection Act, 1991.

8.1 EIA licences

The number of EIA licences issued during the period 1994 to 2000 are shown in Table 8.1. On average, 88 licences have been granted each year. In 2000, 92 licences were granted, of which land parcelling and poultry rearing accounted for 34 % and 28 % respectively.

8.2 Complaints

Table 8.2 lists the number of complaints by category received at the Department of Environment from 1994 to 2000. On average, 385 complaints were received yearly between 1994 and 1999. The largest cause of complaint was noise, accounting for over 25 % of all complaints during that period. A marked increase was observed in 2000 when the number of complaints received was more than five times that of 1994. This was mainly due to the increasing awareness of the public to environmental issues and to the creation of the "Flying Squad" and the "Hot Line" to attend to complaints.

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Concepts and definitions

Economy

Gross Domestic Product (GDP): GDP is the aggregate money value of all goods and services produced within a country out of economic activity during a specified period, usually a year, before provision for the consumption of fixed capital.

Energy intensity: Energy intensity provides a measure of the efficiency with which energy is being used in production or energy used (tonnes of oil equivalent) per Rs 100,000 GDP (at constant prices)

Land use, Agriculture and Forestry

Land use: Land use refers to the main activity taking place on an area of land, for example, farming, forestry or housing.

Built-up areas: Built-up areas consist of land under houses, industrial zones, quarries or any other facilities, including their auxiliary spaces, deliberately installed so that human activities may be pursued.

Nutrient: A nutrient is a substance, element or compound necessary for the growth and development of plants.

Energy

Primary energy requirement: It is the sum of imported fuels and locally available fuels less re-exports of bunkers and aviation fuel to foreign aircraft after adjusting for stock changes.

Greenhouse gas emissions

Greenhouse gases (GHG): GHG are gases occurring naturally and resulting from human activities (production and consumption); that contribute directly or indirectly to global warming. Some main naturally existing GHG are Carbon Dioxide (CO₂), methane (CH₄) and Nitrous Oxide (N₂O). Other gases such as Carbon monoxide (CO), oxides of Nitrogen (NO_x), non methane volatile organic compounds (NMVOC) and Sulphur dioxide contribute indirectly to global warming. GHG's act much like a glass greenhouse, trapping heat in the lower levels of the atmosphere and reflecting the heat back to the earth's surface, causing it to heat up.

Water

Water balance: The water balance is based on long term records of annual average rainfall and indicates how freshwater resources are distributed.

Precipitation: Rain falling from the atmosphere and deposited on land or water surfaces.

Evapotranspiration: Combined loss of water by evaporation from the soil or surface water and transpiration from plants and animals.

Surface runoff: The flow of surface water from rainfall, which flows directly to streams, rivers and lakes. Runoff may cause soil erosion.

Groundwater recharge: Process by which water is added from outside to fresh water found beneath the earth surface.

Waste (definition from United Nations Glossary of Environment Statistics)

Solid waste: These are useless and sometimes hazardous material with low liquid content. Solid waste includes domestic garbage, industrial and commercial waste, sewage sludge, wastes resulting from agricultural and animal husbandry operations and other connected activities, demolition wastes and mining residues.

Landfill: Final placement of waste in or on the land in a controlled or uncontrolled way according to different sanitary, environmental protection and other safety requirements.

Environmental impact assessment

Environmental impact assessment (EIA): Analytical process that systematically examines the possible environmental consequences of the implementation of projects, programmes and policies.

ABBREVIATIONS AND SYMBOLS

Abbreviations

Rs mn	Rupees million
Rs	Rupees
US\$	US dollar
%	Percentage
f.o.b	free on board
c.i.f	Cost, insurance, freight
000	Thousand
n.e.s	Not elsewhere specified
Mm ³	Million cubic metres
Gg	Gigagram (thousand tonne)
ktoe	Thousand tonne of oil equivalent
toe	Tonne of oil equivalent

Symbols

-	Nil or negligible
...	Not available

Conversion factor

1 square kilometre = 100 hectares

1.The Economy

Table 1.1 Main socio-economic indicators,1990 and 2000.

Indicator	Units	1990	2000 ¹
1. Gross Domestic Product (GDP) Current market prices	Rs mn	39,629	118,478
2. Sectoral contribution to GDP			
<i>Agriculture</i>	%	12.8	6.7
<i>Manufacturing</i>	%	24.2	23.8
<i>Construction</i>	%	6.6	6.0
<i>Wholesale and retail trade</i>	%	13.0	12.5
<i>Hotels and restaurants</i>	%	3.9	5.7
<i>Transport and communications</i>	%	10.3	12.8
<i>Financial intermediation and business services</i>	%	14.4	18.1
<i>Other</i>	%	14.8	14.4
3. GDP annual growth rate (basic prices)	%	7.3	8.6
4. Per capita GDP at market prices	Rs	37,429	99,893
5. Per capita GDP in US dollars	US\$	2,514	3,804
6. Investment (GDFCF)	Rs mn	12,062	28,069
7. Exports (f.o.b) (include re-exports)	Rs mn	18,246	40,882
8. Imports (c.i.f)	Rs mn	24,019	54,928
9. Population (Census figures)	000	1,056.8	1,179.1
10. Population annual growth rate	%	0.8	1.1
11. Population density (per km ²)	Number	518	578
12. Total labour force	000	433.0	542.0
13. Total employment	000	420.8	499.8
<i>Agriculture (as a % of total)</i>	%	15.2	11.1
<i>Manufacturing (as a % of total)</i>	%	31.5	29.6
14. Unemployment rate	%	2.8	8.0
15. Inflation rate	%	13.5	4.2
16. Tourist arrivals	000	291.6	656.5
17. Primary energy requirement	ktoe	734.3	1,164.6
18. Energy intensity	toe per Rs 100,000 GDP	2.2	1.9

¹ Provisional

2. Land use, Agriculture and Forestry.

Table 2.1 - Land use, Island of Mauritius, 1986 and 1995.

	1986 ¹		1995 ²		Change %
	Hectares	%	Hectares	%	
Agriculture	90,000	48.2	86,500	46.4	-1.8
<i>Sugarcane</i>	83,625	44.8	76,840	41.2	-3.6
<i>Other agricultural activities</i>	6,375	3.4	9,660	5.2	+1.8
Forests, scrubs & grazing lands	65,400	35.1	57,000	30.6	-4.5
Reservoirs, ponds, swamps & rocks	2,610	1.4	2,600	1.4	0.0
Road and footpaths	3,465	1.9	4,000	2.1	+0.2
Built-up areas	25,000	13.4	36,400	19.5	+6.1
Total	186,475	100.0	186,500	100.0	

¹ Source : Digest of Agricultural Statistics

² Source : Initial National Communication under the United Nations Framework Convention on Climate Change, April 1999

Note: The difference in total area between 1986 and 1995 is due to rounding

Fig.1 - Land use by category, Island of Mauritius, 1995.

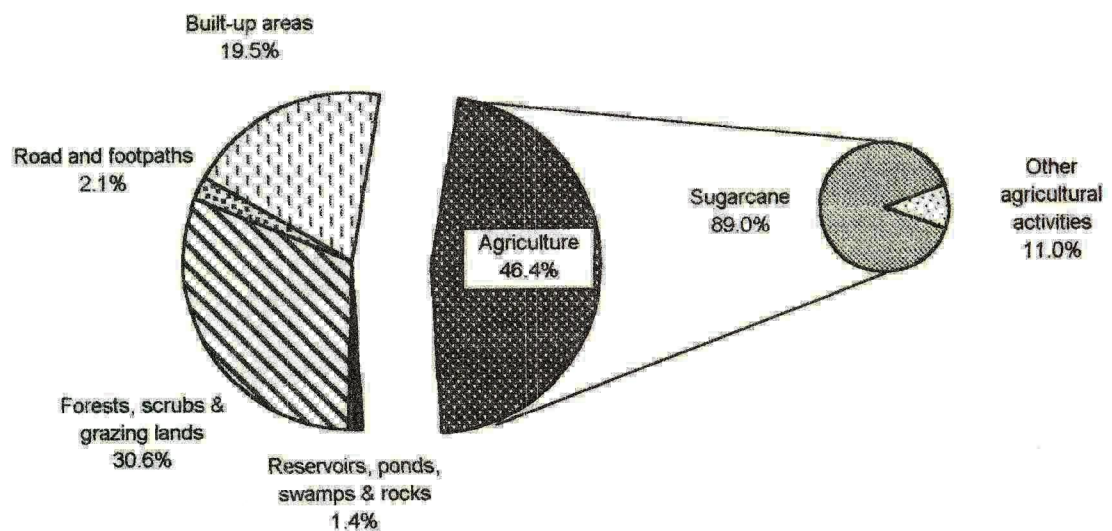


Table 2.2 - Forest area by category, Island of Mauritius, 1990, 1995 and 2000.

Hectares

	1990	1995	2000 ¹
State - owned	22,183	22,519	22,089
Plantations	12,280	12,557	12,120
Nature reserves	4,585	4,585	799
<i>On mainland</i>	<i>4,018</i>	<i>4,018</i>	<i>200</i>
<i>Islets</i>	<i>567</i>	<i>567</i>	<i>599</i>
National Park	-	-	6574 ²
Unplanted, protective or to be planted	4,666	4,725	1,944
Pas Geometriques	652	652	652
<i>Plantations</i>	<i>211</i>	<i>209</i>	<i>224</i>
<i>Leased for grazing and tree planting</i>	<i>230</i>	<i>230</i>	<i>230</i>
<i>Unplanted, protective or to be planted</i>	<i>211</i>	<i>213</i>	<i>198</i>
Privately - owned lands	34,540	34,540	34,540
Reserves	6,540	6,540	6,553
<i>Mountain reserves</i>	<i>3,800</i>	<i>3,800</i>	<i>3,800</i>
<i>River reserves</i>	<i>2,740</i>	<i>2,740</i>	<i>2,740</i>
<i>Nature Reserves</i>	-	-	<i>13</i>
Forest lands, incl. scrub, grazing lands ³	28,000	28,000	27,987
Total	56,723	57,059	56,629

Source : Forestry Department of the Ministry of Agriculture, Food Technology and Natural Resources.

¹ Provisional² Black River Gorges National Park was proclaimed in 1994 and data on the area enclosed by the boundaries of the park were not available until 1997³ Figures not available but estimated

3. Energy

Table 3.1 - Primary energy requirements by energy source, 1990, 1995 and 2000.

ktoe (000 Tonne of oil equivalent)

Energy Source	1990	1995	2000
Imported (%)	(59%)	(66%)	(77%)
Oil ¹	374.6	508.1	680.8
Liquefied petroleum gas (LPG)	24.3	37.0	53.4
Coal	34.9	39.1	156.9
Local (%)	(41%)	(34%)	(23%)
Electricity - hydro	18.8	29.6	20.9
Bagasse	252.2	262.4	248.5
Fuel wood	29.5	6.8	4.1
Total	734.3	883.0	1,164.6

¹ Includes gasoline, diesel oil, dual purpose kerosene and fuel oil

Table 3.2 - Energy used for electricity production, 1990, 1995 and 2000.

ktoe (000 Tonne of oil equivalent)

Fuel	1990		1995		2000	
	Quantity (Ktoe)	%	Quantity (Ktoe)	%	Quantity (Ktoe)	%
Fuel oil	94.1	59.2	137.2	60.6	168.5	38.8
Diesel oil	3.1	1.9	5.3	2.3	3.4	0.8
Kerosene	11.6	7.3	33.6	14.8	13.6	3.1
Coal	22.5	14.1	18.8	8.3	141.7	32.6
Bagasse	27.8	17.5	31.6	14.0	107.5	24.7
Total	159.0	100.0	226.5	100.0	434.7	100.0

Table 2.3 - Structure of agricultural land area, Island of Mauritius, 1990, 1995 and 2000.

Hectares			
Detail	1990	1995	2000 ¹
Sugarcane	82,355	76,840	77,000
Tea	2,905	2,077	670
Tobacco	635	673	397
Foodcrops ²	3,020	5,000	4,500
Other ³	1,040	1,910	1,550
Total	89,955	86,500	84,117

¹ Provisional figures

² Estimates

³ Estimated uncultivated land

Table 2.4 - Consumption of fertilizers, 1990, 1995 and 2000.

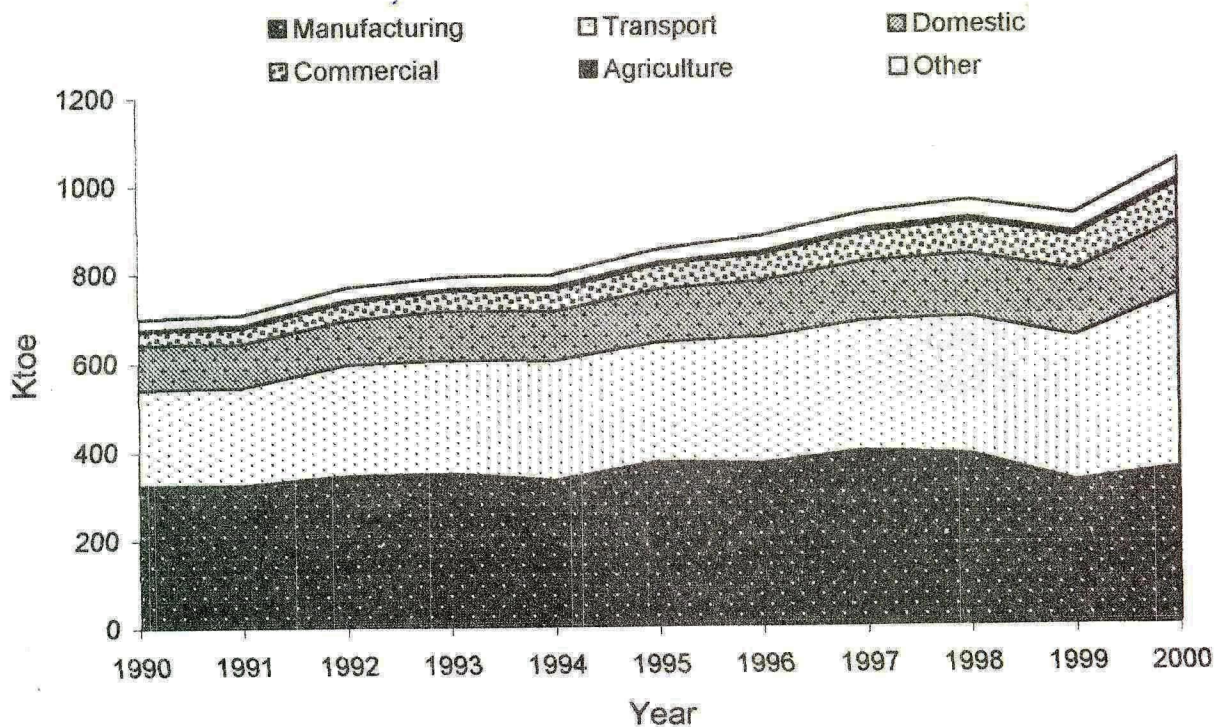
Tonnes			
Detail	1990	1995	2000
Fertilizers	68,547	70,900	67,044
Nutrients content			
<i>Nitrogen</i>	11,426	11,800	11,550
<i>Phosphate</i>	5,609	4,625	3,940
<i>Potash</i>	11,972	14,208	13,464

Table 3.3 - Final energy consumption by end-user, 1990, 1995 and 2000.

ktoe (000 Tonne of oil equivalent)

End user	1990	1995	2000
Manufacturing	325.4 (47%)	373.5 (44%)	354.2 (34%)
Transport	215.8 (31%)	268.8 (31%)	388.9 (37%)
Domestic	99.2 (14%)	119.2 (14%)	164.9 (16%)
Commercial	30.7 (4%)	54.5 (6%)	86.2 (8%)
Agriculture	4.4 (1%)	5.7 (1%)	8.4 (1%)
Other (n.e.s & losses)	22.6 (3%)	30.6 (4%)	46.3 (4%)
Total	698.1 (100%)	852.2 (100%)	1048.9 (100%)

Fig 2- Final energy consumption by end user, 1990 - 2000



4. Transport

Table 4.1 - Stock of registered motor vehicles, Island of Mauritius, 1990, 1995 and 2000.

Type of vehicle	Number		
	1990	1995	2000
Cars and Dual Purpose Vehicle (DPV)	46,793	65,374	89,823
Auto / Motorcycles	57,094	97,809	116,478
Heavy Motor Car and Bus	2,624	3,260	3,310
Van and Lorry	13,201	19,666	29,292
Other vehicles ¹	3,833	4,758	5,115
Total	123,545	190,867	244,018

No of cars & DPVs per 1000 population	45	60	78
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¹ Includes tractor and dumper, prime mover, trailer and road roller

Table 4.2 - Fuel used for transport, 1990, 1995 and 2000.

ktoe (000 Tonne of oil equivalent)

Fuel	1990	1995	2000
Gasolene	64	91	115
Liquefied Petroleum Gas (LPG)	-	-	1
Diesel oil	77	103	161
Aviation fuel	75	75	112
Total	216	269	389