

ENVIRONMENT STATISTICS OF NEPAL 2008



GOVERNMENT OF NEPAL
NATIONAL PLANNING COMMISSION SECRETARIAT
CENTRAL BUREAU OF STATISTICS
KATHMANDU, NEPAL

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2008

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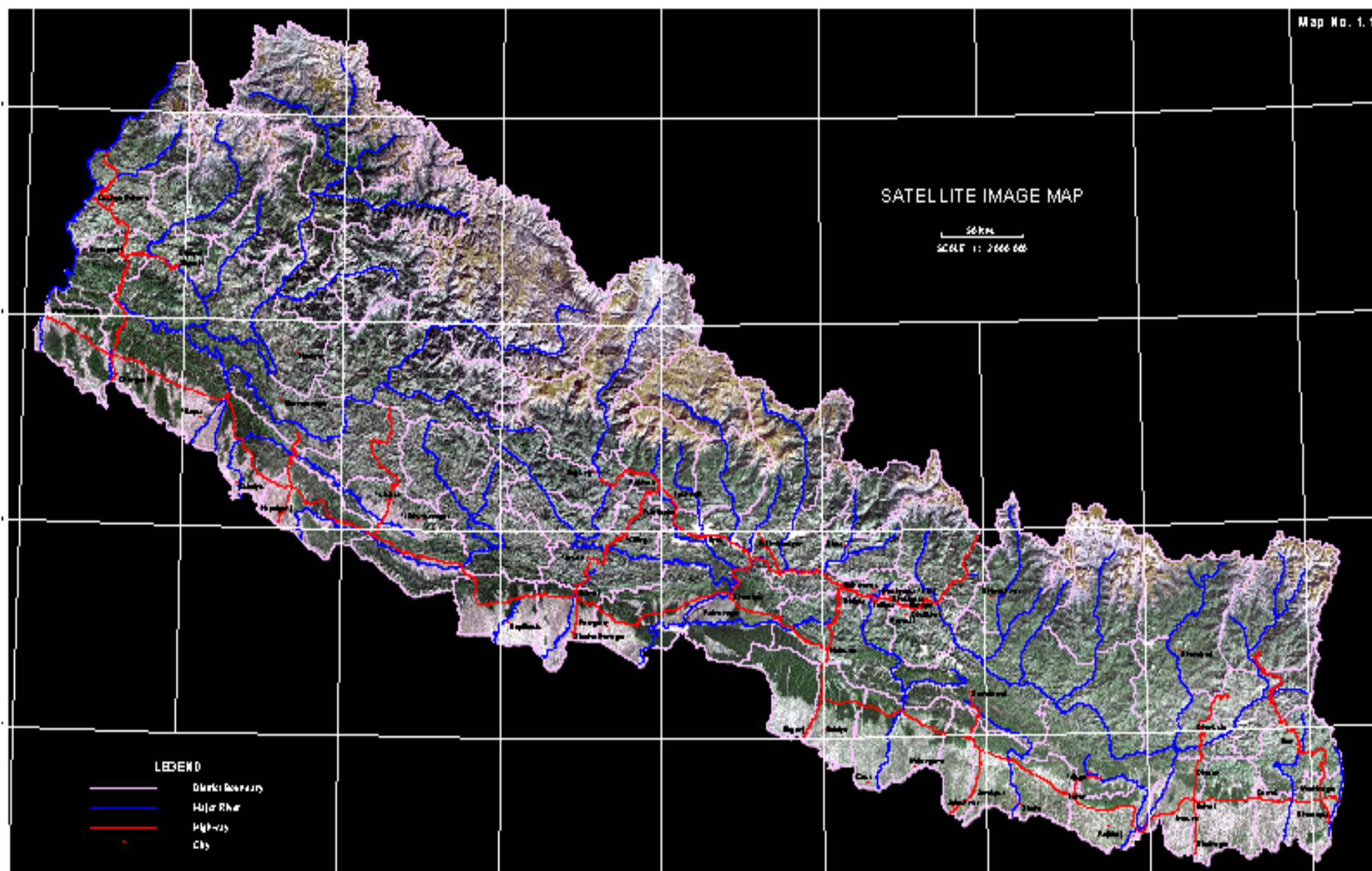
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SATELLITE IMAGE MAP

50 km
SCALE 1: 2000 000

LEGEND

- District Boundary
- Major River
- Highway
- City



Preface

Environment management has become a global concern and accordingly, the demand for environment statistics has been growing rapidly. As an effort to meet the growing demand for environment statistics of Nepal, the Central Bureau of Statistics (CBS) has been compiling and publishing environment statistics regularly and the present issue of 'Environment Statistics of Nepal, 2008' is the sixth in the series.

This Environment Statistics is an update to the previous issue and comprises data on economic issues, social and demographic indicators, air/climate, land/soil, flora and fauna, water and sanitation, human settlement, natural disaster, etc. I hope, this issue would, to some extent, meet the needs of the policymakers, planners and general users.

I would like to thank the government and non-government agencies for their whole hearted cooperation and contributions without which it would not have been possible to bring out this publication. I would also like to express my gratitude to the members of the technical committee formed to bring out this publication.

I would like to express my gratitude to Project Research and Management Associates Pvt. Ltd. (PRAM) for providing consultancy service to review compiled data.

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Finally, I would like to request all users to provide comments and suggestions which would be valuable for the improvement in future publication.

(T. S. Bastola)

Director General

December 2008

Acronyms and Abbreviations

| | |
|-----------------------|--|
| ADB | Asian Development Bank |
| AIDS | Acquired immune deficiency syndrome |
| ARI | Acute respiratory infection |
| As | Arsenic |
| BHC | Boron hydrogen carob |
| BOD | Biological oxygen demand |
| Bq | Becquerel |
| Ca | Calcium |
| CBS | Central Bureau of Statistics |
| Cd | Cadmium |
| CDD | Control of diarrhea diseases |
| CFC | Chlorofluorocarbons |
| cfu | Coliform unit |
| CFUG | Communitary Forest User Group |
| CH₄ | Methane |
| CITES | Convention on International Trade in Endangered Species of World Fauna and Flora |
| CO | Carbon monoxide |
| CO₂ | Carbon dioxide |
| COD | Chemical oxygen demand |
| COFOG | Classification of Functions of Government |
| COICOP | Classification of Individual Consumption by Purpose |
| COPNI | Classification of the Purposes of Non-Profit Institutions |
| CPC | Central Product Classifications |
| dBA | Decibel A |
| DDT | Dichloro diethene trichloroethene |
| DHM | Department of Hydrology Meteorology |
| DO | Dissolved oxygen |
| DMG | Department of Mines and Geology |
| DWSS | Department of Water Supply and Sewage |
| DWIDP | Department of Water Induced Disaster Prevention |
| EIA | Environmental Impact Assessment |
| FISIM | Financial Intermediation Services Indirectly Measured |
| ft³ | Cubic feet |
| GDP | Gross Domestic Product |
| GEF | Global Environment Facility |
| GNDI | Gross National Disposable Income |
| GNI | Gross National Income |
| Ha. | Hectare |
| HC | Hydrocarbon |
| HHs | Households |
| HIV | Human immuno-deficiency virus |
| Hr | Hour |
| HSU | Hatridge smoke unit |
| HVAS | High volume air sampler |

| | |
|---------------------------|--|
| ICIMOD | International Centre for Integrated Mountain Development |
| IPCC | Intergovernmental Panel on Climate Change |
| ISIC | International Standard Industrial Classifications |
| ITTA | International Tropical Timber Agreement |
| IUCN | The World Conservation Union (International Union for the Conservation of Nature and Natural Resources) |
| K₂O | Potassium oxide |
| kg | Kilogram |
| KL | Kilo-liter |
| Km | Kilometer |
| Km² | Square kilometer |
| KUKL | Kathmandu Upatyaka Khanepani Limited |
| KWh | Kilowatt hour |
| L | Liter |
| L/d/p | Liter/day/person |
| lcd | Liter consumption/day |
| LD | Laser dust |
| L_{dn} | Level day-night |
| L_{eq} | Equivalent sound presser level |
| LPG | Liquefied petroleum gas |
| LRMP | Land Resource and Mapping Project |
| Lt/min | Liter per minute |
| M | Million |
| masl | Meter above sea level |
| M². | Square meter |
| M³ | Cubic meter |
| m³/ min | Cubic meter per minute |
| m³/yr | Cubic meter per year |
| MB | Multi-bacilli |
| mb | Mill bar |
| MDGs | Millennium Development Goals |
| MDT | Multi-drug therapy |
| mg/l | Milligram per liter |
| mg/m³ | Milligrams per cubic meter |
| ml | Local magnitude / milliliter |
| mld | Million liter/day |
| mm | Millimeter |
| mrem/hr | Milli radiation equivalent to man/hour |
| mt. | Metric ton |
| mtO | Mineral trepanation oil |
| N | Nitrogen |
| NA | Not Available |
| Na | Sodium |
| NARC | Nepal Agriculture Research Council |
| NAST | Nepal Academy of Science and Technology. |

| | |
|-----------------------------------|--|
| NDHSS | Nepal Demographic and Health Surveys |
| NGO/INGO | Non-government Organization/International Non-government Organization |
| NLSS | Nepal living standards survey |
| NLSSs | Nepal Living Standards Surveys |
| NO₂ | Nitrogen dioxide |
| NP | National Parks |
| NSIC | Nepal Standard Industrial Classifications |
| NTU | Nephelometer turbidity unit |
| NWSC | Nepal Water Supply Corporation |
| O₃ | Ozone |
| °C | Degree Celsius |
| ODS | Ozone depleting substance |
| P₂O₅ | Phosphorus pentaoxide |
| pb | Lead |
| pH | Hydrogen-in concentration |
| PM₁₀ | Particulate matter less than 10 microgram (0.07 g/m ³) |
| PO₃ | Phosphate |
| ppb | Parts per billion |
| ppm | Parts per million |
| ppmv | Parts per million by volume |
| ppt | Parts per trillion |
| SAE | Small Area Estimation |
| SEEA | Integrated Environmental and Economic Accounting |
| SO₂ | Sulphur dioxide |
| SO₄ | Sulphate |
| SO_x | Oxides of Sulphur |
| SPM | Suspended Particulate Matter |
| STD | Sexually Transmitted Diseases |
| TCU | True color unit |
| TDS | Total Dissolved Solids |
| TOE | Tones of Oil Equivalent |
| TSP | Total suspended particulates |
| TSS | Total Suspended Solids |
| TYIP | Three Year Interim Plan |
| UNEP | United Nations Environment Programme |
| UNFDES | United Nations Framework for the Development of Environment Statistics |
| UV | Ultra Violet |
| WECS | Water and Energy Commission Secretariat |
| WHO | World Health Organisation |
| WW | Waste Water |
| µe's | Micro- environments |
| µg/m³ | Microgram per cubic meter |

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Chapter I

Introduction

Introduction

Environment issues cover areas from greenhouse effect to noise pollution, from non-habited polar areas to most densely populated cities and from high altitude of the Himalaya to the oceans. Environmental issues are inextricably related to human beings and biosphere, science and culture, and politics and economy as well. Environment problems such as global warming, melting of snow in the Himalayas, decreasing productivity in agriculture despite technology development etc. do not confine to any country or continent nor is it limited to the developing or the developed world. Therefore, United Nations and other global institutions have been paying attention towards environment management since decades. It has been realized that sustainability of the development depends much upon the management of the environment and hence, the expenditure on environmental management today is in fact, a reliable investment for the safe future.

United Nations initiated actions towards the environment by establishing UNEP in 1972 that aims to coordinate the development of environmental policy by keeping the global environment under review and bringing emerging issues to the attention of the governments and the international community for action.

Development activities now have been linked to the environmental management and accordingly, the demand for environment related information has also increased day-by-day. Therefore, efforts are being made for the development of environment statistics. United Nations Statistics Division has prepared United Nations Framework for the Development of Environment Statistics (UNFDES) which provided framework for the member countries to compile and manage environmental statistics. In fact, numbers of agreements have been signed at regional and global level. Countries have adopted environment related policies and initiated actions towards environment management based on their own needs and capacities.

In the context of Nepal, policies and programs on environment management have been incorporated in the periodic plans. However, priorities varied and immediate needs are reflected in the plans. In early seventies, priorities were given to address soil erosion, flood and landslides and conserve forest resources in the policies, strategies and programs of the periodic plans. In early eighties, emphasis was given on the policy of reducing water pollution generated by industries and urban areas. At the same time, efforts were made to manage resources through people's participation. Remarkable achievements were gained in community forestry but problems began to emerge in urban areas and industrial estates particularly of pollution of solid waste, air, water and noise. On the other hand, rural areas continue to suffer from soil erosion, flood, land slides and reduction in the sources of water. Nevertheless, various initiatives were taken by the government, NGOs, and private sector to address these problems. The government formulated policies and enacted Acts and regulations such as Environment Protection Act, 1996, Environment Protection Rules, 1997 and Ozone Depleting Substances Consumption Rules, 2001 etc. Environment Impact Assessment (EIA) of development works were institutionalized and standards related to the industrial effluents air quality were implemented. But, the outcome of these efforts were not achieved satisfactorily.

The Three Year Interim Plan (TYIP) of Nepal (2007/08 - 2009/10) has categorized environment related problems into two: problems generated by pressure on natural resources and problems generated by climate change. Specific problems identified by the TYIP are as follows:

- Development initiatives in the environment sector aimed to achieve immediate benefit only;
- Environment management could not be implemented for sustainable economic development;
- Efforts were continued to implement programs according to the sectoral development concept rather than solving the problem by finding the causes of environment damage;
- Deforestation, soil erosion, decrease in productivity and desertification, flood, landslide, loss in biodiversity have continued;
- In case of urban areas, the major problems are solid waste management, along with accelerated water and air pollution.

The long term vision of the TYIP is to achieve sustainable economic development by reducing environmental impacts. Accordingly, TYIP aims to help economic development by reducing the pressure on the environment through the implementation of the international agreement and conventions. Based on the vision and the objectives, following policies and working policies are included in the plan:

- An integrated environmental policy will be formulated and implemented;
- Implementation of works like cleaner production and energy efficiency and environment monitoring and auditing will be widened by adopting environment standards;
- Programs will be formulated, implemented, and monitored according to the spirit of the multilateral environmental agreements to which Nepal is a party;
- By integrating the aspects of environment conservation with infrastructure development and social and economic development works, programs will be implemented and implementation status will be made public on a regular basis.

Monitoring and evaluation of the policies and programs are key to the successful implementation of the plan. However, proper monitoring and evaluation has been difficult due to data and information gaps.

Environment statistics is still a new area in the Statistical System of Nepal. Central Bureau of Statistics (CBS) first brought out 'Compendium on Environment Statistics of Nepal, 1998' with an attempt to analyze available data on various aspect of the environment of Nepal. However, database on the environment was limited. Therefore, CBS made another attempt by compiling and publishing its first publication 'Environment Statistics of Nepal, 2001'. The present issue of 'Environment Statistics of Nepal, 2008' is the sixth in the series.

The present issue has been organized with data on various aspects of the Nepalese environment as follows:

Chapter I outlines introductory remarks on environmental statistics and policy focus.

Chapter II of the book contains statistical tables related to economic issues. Macro economic indicators are presented in tables particularly, GDP by industrial sectors, GDP growth rates, consumption and

investment. Also, estimates of agricultural production and manufacturing sectors are provided. The data presented in this chapter are based on crop cutting surveys, survey of manufacturing establishment and the data compiled for National Accounting purposes.

Chapter III contains a social and demographic aspect which includes population data provided by National Population Censuses of Nepal and Nepal Demographic and Health Surveys (NDHSs). Education data was provided by Ministry of Education. Poverty data is based on Nepal Living Standards Surveys (NLSSs). Data on calorie intake and malnutrition are based mainly on Small Area Estimation (SAE) conducted by CBS.

Chapter IV presents data on air and climate based on the data obtained from the Department of Hydrology and Meteorology. Data on temperature, rainfall, wind speed and sunshine duration are collected from stations located in various districts of the country.

Chapter V deals mainly on land and soil data, land use, livestock in arid and semi arid land, use of fertilizer and pesticides. Major sources of data are National Sample Censuses of Agriculture conducted by CBS, Land Resource and Mapping Project (LRMP), Department of Forest, Department of Forest Research and Survey, Department of Soil Conservation and Watershed Management. Information provided by specific surveys and secondary sources are also included.

Chapter VI deals on water. Data on supply of drinking water provided by various agencies, quality of water, standards set for water use for various purposes are presented in this chapter. Major sources of data were Department of Irrigation, Department of Water Supply and Sewage (DWSS), Nepal Water Supply and Corporation (NWSC) and Water and Energy Commission Secretariat (WECS).

Chapter VII contains data on other natural resources, extraction of mineral resources, forestry and fuel wood consumption and energy consumption.

Chapter VIII contains data on waste disposal and hazardous waste management.

Chapter IX covers human settlement and data included in the chapter are mainly urban population, housing status, vehicles in use etc. Major sources of information are CBS and Department of Transport Management.

Chapter X contains information on natural disasters provided by the Ministry of Home Affairs.

Appendices include UNFDES (major group), list of Conventions, Acts and Rules related to environment management, Agenda 21, major divisions/sections of International Classifications such as ISIC, COPNI, COPP, CPC, COICOP, COFOG, Natural Assets, SEEA and MDGs Indicators.

A Glossary has also been included to facilitate for common understanding.

Chapter II

Economic Issues

**Table 2.1 : Selected Macro Economic Indicators of Nepal
(2000/01 – 2007/08)**

(Rs. in millions)

| Description | 2057/58 | 2058/59 | 2059/60 | 2060/61 | 2061/62 | 2062/63F | 2063/64R | 2064/65P |
|--|---------|---------|---------|---------|---------|----------|----------|----------|
| | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 |
| Per capita GDP (NRs) | 19071 | 19410 | 20340 | 21694 | 23300 | 25289 | 27497 | 30361 |
| Per capita GNI (NRs) | 19144 | 19385 | 20312 | 21626 | 23365 | 25481 | 27778 | 30738 |
| Per capita GNDI (NRs) | 21978 | 22265 | 23433 | 25056 | 27227 | 30358 | 32656 | 36597 |
| Per capita GDP at constant price | 19071 | 18682 | 18990 | 19467 | 19683 | 20042 | 20289 | 20816 |
| Per capita GNI at constant price | 19144 | 18658 | 18964 | 19406 | 19738 | 20193 | 20497 | 21074 |
| Per capita GNDI at constant price | 21978 | 21431 | 21878 | 22485 | 23001 | 24059 | 24096 | 25090 |
| Annual change in nominal per capita GDP (%) | | 1.78 | 4.79 | 6.66 | 7.41 | 8.54 | 8.73 | 10.42 |
| Annual change in real per capita GDP(%) | | -2.04 | 1.65 | 2.51 | 1.11 | 1.82 | 1.24 | 2.59 |
| Per capita GDP (USD) | 259 | 255 | 261 | 293 | 328 | 350 | 390 | 470 |
| Per capita GNDI in (USD) | 260 | 254 | 261 | 292 | 329 | 352 | 394 | 476 |
| Per capita GNDI in (USD) | 298 | 292 | 301 | 339 | 383 | 420 | 463 | 566 |
| Total consumption as percentage of GDP | 88.34 | 90.51 | 91.44 | 88.25 | 88.44 | 91.02 | 90.26 | 88.53 |
| Gross domestic saving as percentage of GDP | 11.66 | 9.49 | 8.56 | 11.75 | 11.56 | 8.98 | 9.74 | 11.47 |
| Gross national saving as percentage of GDP | 26.91 | 24.20 | 23.77 | 27.25 | 28.41 | 29.02 | 28.50 | 32.00 |
| Exports of goods and services as percentage of GDP | 22.56 | 17.74 | 15.70 | 16.68 | 14.58 | 13.45 | 13.06 | 12.04 |
| Imports of goods and services as percentage of GDP | 33.24 | 28.49 | 28.55 | 29.46 | 29.48 | 31.32 | 31.35 | 32.56 |
| Resource gap as percentage of GDP (+/-) | 4.56 | 3.95 | 2.36 | 2.72 | 1.96 | 2.17 | 0.48 | 0.01 |
| Annual GDP growth rate at basic price (%) | | 0.16 | 3.77 | 4.41 | 2.85 | 4.11 | 2.58 | 5.56 |
| Gross fixed capital formation as percentage of GDP | 19.20 | 19.56 | 19.92 | 20.34 | 19.94 | 20.72 | 20.41 | 21.05 |
| Average exchange rate (USD: NRs) | 73.70 | 76.25 | 77.83 | 73.97 | 71.05 | 72.32 | 70.49 | 64.64 |
| Population (in millions) | 23.15 | 23.67 | 24.20 | 24.74 | 25.30 | 25.86 | 26.44 | 27.03 |

F = Final, R = Revised, P = Preliminary

Source : Central Bureau of Statistic, 2008.

Table 2.2 : Gross Value Added by Industrial Division
(at current prices)

(Rs. in millions)

| NSIC | Industries | 2057/58 | 2058/59 | 2059/60 | 2060/61 | 2061/62 | 2062/63F | 2063/64R | 2064/65P |
|--|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 |
| A | Agriculture and forestry | 153781 | 163925 | 170634 | 183621 | 196686 | 208591 | 223535 | 254453 |
| B | Fishing | 1844 | 2165 | 2168 | 2504 | 2682 | 3113 | 3287 | 3829 |
| C | Mining and quarrying | 1817 | 2149 | 2310 | 2507 | 2748 | 3134 | 3417 | 3857 |
| D | Manufacturing | 38409 | 37736 | 38826 | 41673 | 44885 | 47840 | 52172 | 55900 |
| E | Electricity, gas and water | 7750 | 9138 | 11447 | 11974 | 12782 | 13172 | 14841 | 15556 |
| F | Construction | 25585 | 28838 | 30955 | 33254 | 36644 | 40952 | 45099 | 51044 |
| G | Wholesale and retail trade | 69928 | 64778 | 68695 | 79219 | 79839 | 90214 | 93749 | 107731 |
| H | Hotels and restaurants | 8459 | 7143 | 7540 | 8942 | 8895 | 9368 | 10018 | 11378 |
| I | Transport, storage and communications | 31425 | 34959 | 39362 | 46283 | 51336 | 61250 | 69364 | 73697 |
| J | Financial intermediation | 11455 | 12202 | 12861 | 13728 | 17342 | 21979 | 28539 | 37666 |
| K | Real estate, renting and business activities | 35267 | 36525 | 38251 | 39991 | 49242 | 60042 | 70791 | 78524 |
| L | Public administration and defence | 5288 | 7237 | 8070 | 8019 | 9548 | 10967 | 12227 | 15069 |
| M | Education | 17372 | 20823 | 24582 | 26313 | 31671 | 34996 | 40517 | 47455 |
| N | Health and social work | 4178 | 4626 | 5408 | 5825 | 7017 | 7842 | 8956 | 10786 |
| O | Other community, social and personal service activities | 12896 | 11808 | 12436 | 14140 | 15262 | 16840 | 20476 | 25186 |
| Gross value added of agriculture and forestry sector (A) including FISIM | | 153781 | 163925 | 170634 | 183621 | 196686 | 208591 | 223535 | 254453 |
| Gross Value added of non-agriculture sector (B-O) including FISIM | | 271673 | 280127 | 302911 | 334372 | 369893 | 421709 | 473454 | 537677 |
| Gross value added at basic prices including FISIM | | 425454 | 444052 | 473545 | 517994 | 566579 | 630301 | 696989 | 792130 |
| Financial intermediation services indirectly measured (FISIM) | | 12026 | 13655 | 13221 | 17294 | 18094 | 19212 | 21505 | 23298 |
| Gross domestic product at basic prices | | 413428 | 430397 | 460325 | 500699 | 548485 | 611089 | 675484 | 768832 |
| Taxes less subsidies on products | | 28090 | 29046 | 31906 | 36050 | 40927 | 42966 | 51605 | 51982 |
| Gross domestic product at producers' prices | | 441519 | 459443 | 492231 | 536749 | 589412 | 654055 | 727089 | 820814 |

F = Final, R = Revised, P = Preliminary

Note : NSIC Division P & Q are included in the Division O.

Source : Central Bureau of Statistics.

Table 2.3 : Gross Value Added by Industrial Division
(at 2000/01 prices)

(Rs. in millions)

| NSIC | Industries | 2057/58 | 2058/59 | 2059/60 | 2060/61 | 2061/62 | 2062/63F | 2063/64R | 2064/65P |
|--|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 |
| A | Agriculture and forestry | 153781 | 158417 | 163676 | 171394 | 177304 | 180260 | 181958 | 192241 |
| B | Fishing | 1844 | 2005 | 2085 | 2340 | 2507 | 2755 | 2838 | 3039 |
| C | Mining and quarrying | 1817 | 1977 | 2040 | 2031 | 2169 | 2348 | 2383 | 2451 |
| D | Manufacturing | 38409 | 36364 | 36380 | 37163 | 38136 | 38898 | 39891 | 39963 |
| E | Electricity gas and water | 7750 | 8631 | 10274 | 10693 | 11117 | 11562 | 13065 | 13514 |
| F | Construction | 25585 | 27225 | 27798 | 27701 | 28503 | 30690 | 31453 | 32432 |
| G | Wholesale and retail trade | 69928 | 61837 | 63233 | 70066 | 65694 | 68099 | 65066 | 69247 |
| H | Hotels and restaurants | 8459 | 6917 | 7056 | 7955 | 7525 | 7976 | 8258 | 8881 |
| I | Transport, storage and communications | 31425 | 34055 | 35825 | 38509 | 39272 | 42001 | 43868 | 46764 |
| J | Financial intermediation | 11455 | 11892 | 12090 | 12838 | 15957 | 19843 | 22103 | 25155 |
| K | Real estate, renting and business activities | 35267 | 33543 | 32212 | 31538 | 34700 | 36900 | 41240 | 43064 |
| L | Public administration and defence | 5288 | 7237 | 8070 | 8019 | 8551 | 9139 | 9262 | 9785 |
| M | Education | 17372 | 21030 | 23913 | 25138 | 27606 | 28640 | 30426 | 31831 |
| N | Health and social work | 4178 | 4487 | 5171 | 5487 | 6109 | 6470 | 6904 | 7414 |
| O | Other community, social and personal service activities | 12896 | 11785 | 12303 | 13955 | 13483 | 13933 | 15574 | 17298 |
| Gross value added of agriculture and forestry sector (A) including FISIM | | 153781 | 158417 | 163676 | 171394 | 177304 | 180260 | 181958 | 192241 |
| Gross value added of non-agriculture sector (B-O) including FISIM | | 271674 | 268983 | 278451 | 293432 | 301328 | 319254 | 332330 | 350837 |
| Gross value added at basic prices including FISIM | | 425454 | 427400 | 442127 | 464826 | 478632 | 499514 | 514288 | 543079 |
| Financial intermediation services indirectly measured (FISIM) | | 12026 | 13308 | 12428 | 16172 | 17180 | 19105 | 21476 | 22867 |
| Gross domestic product at basic prices | | 413428 | 414092 | 429699 | 448654 | 461452 | 480409 | 492812 | 520212 |
| Taxes less subsidies on products | | 28090 | 27957 | 29789 | 32350 | 34574 | 34051 | 38078 | 35639 |
| Gross domestic product at producers' prices | | 441519 | 442048 | 459488 | 481004 | 496026 | 514460 | 530890 | 555850 |

F = Final, R = Revised, P = Preliminary

Note : NSIC Division P & Q are included in the Division O.

Source : Central Bureau of Statistics.

Table 2.4 : Production of Agricultural Commodities

| Agricultural Commodities | Unit | 1998/99 (2055/56) | 1999/00 (2056/57) | 2000/01 (2057/58) | 2001/02 (2058/59) | 2002/03 (2059/60) | 2003/04 (2060/61) | 2004/05 (2061/62) | 2005/06 (2062/63) | 2006/07 (2063/64) | 2007/08P (2064/65) |
|---------------------------------|-------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|
| Food grains | 000 mt | 6465 | 6985 | 7172 | 7248 | 7361 | 7745 | 7767 | 7656 | 7329 | 8069 |
| Paddy | 000 mt | 3710 | 4030 | 4216 | 4165 | 4133 | 4456 | 4290 | 4209 | 3681 | 4299 |
| Maize | 000 mt | 1346 | 1445 | 1484 | 1511 | 1569 | 1590 | 1716 | 1734 | 1820 | 1879 |
| Wheat | 000 mt | 1086 | 1184 | 1158 | 1258 | 1344 | 1387 | 1442 | 1394 | 1515 | 1572 |
| Millet (Kodo) | 000 mt | 291 | 295 | 283 | 283 | 283 | 283 | 290 | 291 | 285 | 291 |
| Barley | 000 mt | 32 | 31 | 30 | 31 | 32 | 28 | 29 | 28 | 28 | 28 |
| Cash Crops | 000 mt | 3202 | 3428 | 3678 | 3876 | 4020 | 4102 | 4276 | 4597 | 4698 | 4694 |
| Sugarcane | 000 mt | 1972 | 2103 | 2212 | 2248 | 2343 | 2305 | 2376 | 2463 | 2600 | 2485 |
| Oilseeds | 000 mt | 120 | 123 | 132 | 135 | 125 | 133 | 142 | 139 | 136 | 134 |
| Tobacco | 000 mt | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| Jute | 000 mt | 15 | 15 | 16 | 16 | 17 | 17 | 16 | 17 | 17 | 17 |
| Potato | 000 mt | 1091 | 1183 | 1314 | 1473 | 1531 | 1643 | 1739 | 1975 | 1943 | 2055 |
| Other Crops | 000 mt | 2033 | 2180 | 2390 | 2470 | 2585 | 2679 | 2903 | 3006 | 3164 | |
| Pulses | 000 mt | 229 | 237 | 243 | 250 | 257 | 265 | 271 | 267 | 274 | 270 |
| Fruits | 000 mt | 456 | 447 | 487 | 474 | 519 | 511 | 553 | 535 | 575 | 631 |
| Vegetables | 000 mt | 1343 | 1490 | 1653 | 1738 | 1800 | 1890 | 2065 | 2190 | 2299 | 2539 |
| Tea | 000 mt | 4 | 5 | 6 | 7 | 8 | 12 | 13 | 13 | 15 | 16 |
| Coffee | 000 mt | 0.05 | 0.07 | 0.09 | 0.14 | 0.19 | 0.22 | 0.25 | 0.30 | 0.46 | 0.28 |
| Cotton | 000 mt | 0.68 | 0.74 | 0.46 | 0.15 | 0.06 | 0.01 | 0.01 | 0.06 | 0.05 | 0.07 |
| Honey | 000 mt | 0.139 | 0.15 | 0.16 | 0.53 | 0.53 | 0.58 | 0.60 | 0.65 | 0.65 | 1.0 |
| Cocoon | 000 mt | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Spice Crops | 000 mt | 108.16 | 110.45 | 124.27 | 132.38 | 201.06 | 219.86 | 223.26 | 226.91 | 238.64 | |
| Cardamom | 000 mt | 4.33 | 6.53 | 6.08 | 6.18 | 5.68 | 5.98 | 6.07 | 6.65 | 6.79 | 7.1 |
| Turmeric | 000 mt | 8.43 | 10.59 | 13.06 | 15.17 | 21.59 | 23.03 | 23.23 | 23.57 | 25.40 | 25 |
| Ginger | 000 mt | 81.80 | 74.99 | 84.37 | 87.91 | 140.06 | 150.59 | 152.70 | 154.20 | 160.58 | 161 |
| Chilies | 000 mt | 4.82 | 6.36 | 6.53 | 7.08 | 10.87 | 11.97 | 12.62 | 13.78 | 15.57 | 19 |
| Garlic | 000 mt | 8.78 | 11.97 | 14.23 | 16.03 | 22.67 | 28.28 | 28.61 | 28.72 | 30.31 | 31 |

P= preliminary

Source : Ministry of Agriculture and Cooperatives (Agri-Business Promotion and Statistics Division).

Table 2.5 : Production of Livestock Products

| Products | Unit | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/8 |
|------------------------|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| | | (2055/56) | (2056/57) | (2057/58) | (2058/59) | (2059/60) | (2060/61) | (2061/62) | 2062/63 | 2063/64 | 2064/65 |
| Milk Production | (000 mt) | 1073 | 1097 | 1124 | 1159 | 1196 | 1232 | 1274 | 1312 | 1352 | 1389 |
| Cow Milk | | 329 | 337 | 343 | 352 | 362 | 369 | 380 | 385 | 293 | 401 |
| Buff Milk | | 744 | 760 | 781 | 807 | 834 | 863 | 895 | 927 | 959 | 988 |
| Meat Production | (000 mt) | 185 | 189 | 194 | 199 | 204 | 208 | 215 | 219 | 227 | 234 |
| Buffalo | | 120 | 122 | 125 | 128 | 131 | 134 | 139 | 142 | 147 | 151 |
| Mutton (Sheep) | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 |
| Goat | | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 45 | 46 |
| Pig | | 14 | 15 | 15 | 16 | 16 | 15 | 16 | 16 | 16 | 16 |
| Chicken | | 12 | 13 | 13 | 14 | 15 | 16 | 16 | 16 | 16 | 16 |
| Duck | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0.2 | 0.2 |
| Egg Production | No (000) | 46063 | 48080 | 50732 | 53842 | 55736 | 57557 | 59013 | 600800 | 614848 | 631253 |
| Hen Egg | | 44450 | 46453 | 49157 | 52276 | 54173 | 56003 | 57652 | 587219 | 600966 | 617455 |
| Duck Egg | | 1613 | 1627 | 1576 | 1566 | 1564 | 1553 | 1361 | 13581 | 13882 | 13798 |
| Wool Production | (000 kg) | 616 | 615 | 614 | 609 | 601 | 598 | 590 | 587 | 588 | 585 |
| Fish Production | (000 mt) | 27 | 32 | 33 | 35 | 37 | 40 | 42 | 45 | 47 | 48 |

Note : NA= not available

Source : Ministry of Agriculture and Co-operatives, Agri-Business Promotion and Statistics Division.

Table 2.6 : Annual Manufacturing Production Index

| CPC Code | Description | Weight | Fiscal Year | | | | | | | |
|----------|---|--------|-------------|---------|---------|---------|---------|----------|----------|-----------|
| | | % | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06* | 2006/07* | 2007/08** |
| | Manufacture of vegetable oils & fats | 15.78 | 100.00 | 99.17 | 109.58 | 117.44 | 124.14 | 127.67 | 138.64 | 155.86 |
| 2160 | Vegetable ghee | 10.08 | 100.00 | 93.83 | 103.76 | 110.59 | 117.01 | 119.22 | 129.65 | 149.97 |
| 2163 | Mustard oil | 1.95 | 100.00 | 110.44 | 129.94 | 138.84 | 140.74 | 148.95 | 159.96 | 167.56 |
| 2165 | Soyabean oil | 3.74 | 100.00 | 102.30 | 108.61 | 117.70 | 126.75 | 131.72 | 143.29 | 154.66 |
| | Manufacture of dairy products | 2.77 | 100.00 | 100.00 | 100.00 | 101.16 | 102.13 | 108.77 | 116.88 | 126.64 |
| 2211 | Processed milk | 2.77 | 100.00 | 100.00 | 100.00 | 101.16 | 102.13 | 108.77 | 116.88 | 126.64 |
| | Manufacture of grain mill products & animal feeds | 8.16 | 100.00 | 103.37 | 108.61 | 111.64 | 117.57 | 129.65 | 142.72 | 156.54 |
| 2316 | Rice | 4.33 | 100.00 | 103.52 | 107.55 | 110.63 | 115.89 | 131.25 | 147.14 | 165.00 |
| 2311 | Wheat flour | 2.19 | 100.00 | 104.82 | 112.73 | 114.50 | 121.30 | 131.16 | 142.22 | 149.69 |
| 2331 | Animal feed | 1.63 | 100.00 | 97.93 | 99.15 | 106.21 | 112.48 | 118.51 | 126.37 | 138.75 |
| | Manufacture of other food products | 7.93 | 100.00 | 107.37 | 107.79 | 109.62 | 115.68 | 119.81 | 120.74 | 119.47 |
| 2342 | Biscuit | 1.04 | 100.00 | 116.21 | 120.40 | 126.56 | 130.70 | 136.48 | 142.57 | 154.51 |
| 2353 | Sugar | 2.92 | 100.00 | 109.68 | 108.94 | 109.87 | 121.86 | 128.81 | 117.49 | 102.55 |
| 2372 | Noodles | 2.72 | 100.00 | 97.29 | 99.86 | 99.93 | 102.43 | 103.48 | 110.87 | 114.67 |
| 2391 | Processed tea | 1.25 | 100.00 | 96.65 | 94.27 | 98.62 | 99.98 | 103.04 | 112.24 | 121.92 |
| | Manufacture of beverages | 6.59 | 100.00 | 95.88 | 98.70 | 105.48 | 108.64 | 116.92 | 123.28 | 133.45 |
| 2412 | Liquor rectified | 2.39 | 100.00 | 79.47 | 84.72 | 88.72 | 90.04 | 98.09 | 101.51 | 113.74 |
| 2423 | Beer | 2.92 | 100.00 | 103.34 | 105.46 | 113.40 | 119.19 | 126.98 | 136.55 | 144.87 |
| 2449 | Soft drink | 1.28 | 100.00 | 96.88 | 98.49 | 105.72 | 106.82 | 115.03 | 119.94 | 127.26 |
| | Manufacture of tobacco products | 6.53 | 100.00 | 109.24 | 110.80 | 114.76 | 117.01 | 122.37 | 128.31 | 134.90 |
| 2501 | Cigarette | 6.53 | 100.00 | 109.24 | 110.80 | 114.76 | 117.01 | 122.37 | 128.31 | 134.90 |
| | Manufacture of textiles | 5.20 | 100.00 | 95.31 | 96.78 | 100.31 | 105.60 | 110.41 | 119.10 | 120.32 |
| 2621 | Yarn | 3.18 | | | | | | | | |
| 2669 | Cotton clothes | 1.27 | 100.00 | 93.71 | 105.17 | 108.76 | 114.34 | 122.66 | 131.27 | 138.98 |
| 2671 | Synthetic clothes | 0.75 | 100.00 | 89.71 | 94.94 | 98.94 | 104.29 | 96.71 | 99.75 | 103.45 |
| | Manufacture of other textiles | 6.59 | 100.00 | 98.32 | 96.24 | 99.05 | 99.83 | 108.36 | 117.29 | 122.07 |
| 2721 | Woolen carpet | 4.32 | 100.00 | 95.89 | 96.47 | 100.07 | 99.23 | 105.94 | 118.35 | 124.29 |
| 2617 | Jute goods | 2.27 | 100.00 | 102.62 | 95.82 | 97.23 | 101.03 | 112.93 | 115.43 | 118.08 |
| | Manufacture of knitted and crocheted fabrics | 1.18 | | | | | | | | |

Table 2.6 : Annual Manufacturing Production Index (continued...)

| CPC Code | Description | Weight | Fiscal Year | | | | | | | |
|----------|---|--------|-------------|---------|---------|---------|---------|----------|----------|-----------|
| | | % | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06* | 2006/07* | 2007/08** |
| 2819 | Pashmina | 1.18 | | | | | | | | |
| | Manufacture of wearing apparel | 7.14 | 100.00 | 122.76 | 119.38 | 121.69 | 128.57 | 127.17 | 124.71 | 122.64 |
| 2825 | Garment | 7.14 | 100.00 | 122.76 | 119.38 | 121.69 | 128.57 | 127.17 | 124.71 | 122.64 |
| | Manufacture of tanning and dressing of leather | 0.92 | 100.00 | 128.57 | 124.28 | 130.54 | 130.54 | 140.17 | 139.46 | 149.89 |
| 2912 | Processed leather | 0.92 | 100.00 | 128.57 | 124.28 | 130.54 | 130.54 | 140.17 | 139.46 | 149.89 |
| | Manufacture of saw milling and planning of wood | 0.95 | 100.00 | 113.38 | 119.39 | 123.90 | 128.40 | 136.25 | 141.47 | 149.14 |
| 3110 | Wood sawn | 0.95 | 100.00 | 113.38 | 119.39 | 123.90 | 128.40 | 136.25 | 141.47 | 149.14 |
| | Manufacture of paper & paper products | 1.42 | 100.00 | 101.91 | 104.72 | 105.54 | 109.32 | 116.34 | 121.67 | 124.62 |
| 3214 | Paper excluding newsprint | 1.42 | 100.00 | 101.91 | 104.72 | 105.54 | 109.32 | 116.34 | 121.67 | 124.62 |
| | Publishing / Printing and reproducing of recorded media | 1.58 | | | | | | | | |
| 3230 | Newspaper | 1.58 | | | | | | | | |
| | Manufacture of other chemical products | 10.34 | 100.00 | 96.00 | 108.24 | 114.03 | 114.48 | 120.82 | 133.84 | 153.09 |
| 3529 | Medicine | 7.01 | | | | | | | | |
| 3532 | Soap | 3.33 | 100.00 | 96.00 | 108.24 | 114.03 | 115.41 | 120.69 | 131.13 | 140.02 |
| | Manufacture of plastic product | 4.75 | 100.00 | 95.24 | 99.43 | 105.60 | 109.62 | 122.06 | 127.35 | 126.50 |
| 2520 | Plastic product | 4.75 | 100.00 | 95.24 | 99.43 | 105.60 | 109.62 | 122.06 | 127.35 | 126.50 |
| | Manufacture of non metallic mineral products nec | 5.34 | 100.00 | 108.71 | 113.26 | 123.41 | 126.69 | 131.14 | 142.95 | 157.24 |
| 3735 | Bricks | 2.42 | 100.00 | 112.87 | 118.69 | 127.98 | 131.84 | 139.47 | 150.19 | 172.89 |
| 3744 | Cement | 2.92 | 100.00 | 103.75 | 106.80 | 117.96 | 120.76 | 122.70 | 135.18 | 142.96 |
| | Manufacture of other fabricated metal product | 3.70 | 100.00 | 101.36 | 108.98 | 129.63 | 156.75 | 152.23 | 164.67 | 187.88 |
| 4291 | Iron rod & billets | 3.70 | 100.00 | 105.99 | 113.79 | 141.26 | 170.82 | 165.90 | 179.45 | 204.75 |
| | Manufacture of casting of metal | 1.45 | | | | | | | | |
| 4251 | Domestic metal product | 1.45 | | | | | | | | |
| | Manufacture of electric wire and cable | 1.68 | 100.00 | 106.12 | 106.12 | 106.45 | 118.61 | 126.14 | 134.09 | 147.22 |
| 4651 | Electrical wire & cable | 1.68 | 100.00 | 106.12 | 106.12 | 106.45 | 118.61 | 126.14 | 134.09 | 147.22 |
| | Overall Index of Manufacturing Production | 100.00 | 100.00 | 103.41 | 106.23 | 111.44 | 116.36 | 122.00 | 130.04 | 139.16 |

* Revised estimate; ** preliminary revised estimate

Source: Central Bureau of Statistics

Table 2.7 : Production of Various Minerals and Quarrying Products

| Minerals | Unit | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2007/08 |
|--|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|
| | | (2055/56) | (2056/57) | (2057/58) | (2058/59) | (2059/60) | (2060/61) | (2061/62) | 2064/65 |
| 1.Red Clay | m ³ | 3119 | 2304 | NA | NA | 13736 | 12181 | 14785 | 11095 |
| 2. Limestone (Chemical grade) | mt | 9400 | 19360 | 15587 | 24354 | 13025 | NA | NA | 631509 |
| 3. Magnetite | mt | NA | NA | NA | NA | NA | 50 | 56 | |
| 4. Kynite | | | | | | | | | |
| i. I. Q. | mt | | | | 9 | 4 | 10 | 27 | |
| ii. G. Q. | kg. | | | | 1004 | 420 | 1150 | 2880 | |
| 5. Quartz crystal | | | | | | | | | |
| i. I. Q. | mt | | 94 | 123 | 172 | 177 | 122 | 109 | |
| ii. G. Q. | kg | | 2830 | 430 | 1720 | 1765 | 1215 | 1092 | |
| 6. Salt | mt | 1 | 2 | 5 | 5 | 5 | 4 | 2.45 | |
| 7. Talc | mt | 6157 | 5852 | 3923 | 2621 | 6905 | 3435 | 5832 | 7946 |
| 8. Tourmaline | mt I. Q | | | | | NA | NA | 7 | |
| 9. Coal (sub bit) | mt | 10954 | 17530 | 6589 | 9612 | 11848 | 10459 | 9259 | 13845 |
| 10. Lignite | mt | | | | | NA | 58 | 30 | 60 |
| Mica | mt | | | | | | | | 10 |
| 11. Limestone (Cement Grade) | mt | 401700 | 244586 | 237810 | 356218 | 269379 | 388109 | 263701 | |
| 12. Marble | mt | | | | | | | | 1781 |
| i. Aggregates | m ³ | 37283 | 39400 | 41211 | 42320 | 40936 | 40368 | 48157 | |
| ii. Chips | mt | 660 | 654 | 6065 | 537 | 395 | 481 | 436 | |
| iii. Crazy | Sq. m. | 2092 | 1530 | 1333 | 2279 | 681 | 728 | NA | |
| v. Slab | Sq. m | 70475 | 79700 | 54834 | 46156 | 46197 | 56014 | 2358 | |

Sources: Department of Mines and Geology.

Table 2.8 : Supply of Forest Products

| Forest Production | Unit | Year | | | |
|-------------------|-----------------|---------|---------|---------|---------|
| | | 2002/03 | 2003/04 | 2004/05 | 2005/06 |
| Herbal | kg | NA | NA | 4575579 | 4575579 |
| Timber | ft ³ | 890189 | 973043 | 926310 | 924843 |
| Lauth Salla | kg | NA | NA | 7535 | 7535 |
| Khair | kg | 5112785 | 500106 | 16210 | 16210 |
| Argeli | kg | NA | NA | 13999 | 13999 |
| Khoto | kg | NA | 5803 | 4091748 | 4091747 |
| Lokta | kg | NA | NA | 109953 | 109953 |

Source : Department of Forests (Community Forest Division).

Table 2.9 : Food Consumption Pattern (NLSS Food Basket Composition)

(per capita/g/d)

| S. No | Food Items | 1995/96 | 2003/04 |
|-------|---------------|---------|---------|
| 1 | Fine rice | 26.15 | 26.40 |
| 2 | Coarse rice | 217.30 | 219.35 |
| 3 | Beaten rice | 3.47 | 3.50 |
| 4 | Maize | 58.55 | 59.10 |
| 5 | Maize flour | 40.07 | 40.45 |
| 6 | Wheat flour | 91.77 | 92.64 |
| 7 | Millet | 35.57 | 35.91 |
| 8 | Black pulse | 1.90 | 1.92 |
| 9 | Masoor | 8.17 | 8.25 |
| 10 | Rahar | 1.02 | 1.03 |
| 11 | Grams | 0.72 | 0.73 |
| 12 | Eggs | 0.49 | 0.49 |
| 13 | Milk | 30.70 | 31.06 |
| 14 | Baby milk | 0.01 | 0.01 |
| 15 | Curd | 1.21 | 1.22 |
| 16 | Ghee | 1.17 | 1.19 |
| 17 | Vegetable oil | 0.22 | 0.22 |
| 18 | Mustard | 7.35 | 7.42 |
| 19 | Potatoes | 28.88 | 29.15 |
| 20 | Onions | 5.84 | 5.90 |
| 21 | Cauliflower | 4.06 | 4.10 |
| 22 | Tomatoes | 2.41 | 2.43 |
| 23 | Bananas | 3.70 | 3.74 |
| 24 | Citrus fruit | 0.85 | 0.85 |
| 25 | Mangoes | 4.99 | 5.04 |
| 26 | Apples | 0.37 | 0.38 |
| 27 | Pineapple | 0.10 | 0.10 |
| 28 | Papaya | 1.70 | 1.71 |
| 29 | Fish | 1.72 | 1.73 |
| 30 | Mutton | 1.64 | 1.66 |

Table 2.9 : Food Consumption Pattern (NLSS Food Basket Composition) (contd...)

(per capita/g/d)

| S. No | Food Items | 1995/96 | 2003/04 |
|-------|------------|---------|---------|
| 31 | Buff | 1.79 | 1.81 |
| 32 | Chicken | 1.08 | 1.09 |
| 33 | Salt | 13.31 | 13.44 |
| 34 | Sugar | 3.55 | 3.58 |
| 35 | Gur | 0.77 | 0.78 |
| 36 | Sweets | 1.91 | 1.93 |
| 37 | Tea | 0.25 | 0.26 |

Note : Food consumption of the NLSS-II poverty basket is obtained by adjusting the NLSS-I basket for the change in the demographic composition of an average Nepali household.

Source : Central Bureau of Statistics (Poverty Trends in Nepal, 2005).

Table 2.10 : Radioactivity and Concentration Rate in Water Samples of the Sangala Khola

| Sample No. | Gross Bq/L | Uranium | | Thorium | | Potassium | |
|------------|------------|---------|-----|---------|-----|-----------|------|
| | | Bq/kg | ppb | Bq/kg | ppb | Bq/kg | ppb |
| W-1 | 1226.6 | 126.4 | 80 | 128.5 | 40 | 985.5 | 18.7 |
| W-2 | 955.4 | 156.6 | 80 | 124.6 | 20 | 424.6 | 17.6 |
| W-3 | 902.5 | 148.5 | 60 | 118.4 | 20 | 437.2 | 10.2 |
| W-4 | 876.4 | 110.7 | 60 | - | - | 90.8 | 4.3 |

Source : Ministry of Environment, Science and Technology and Nuclear Society of Nepal (A Study Report : "Radio Active Elements up take" by Dr. Kamal Krishna Shrestha, 2007).

Table 2.11 : Gross Radioactivity in *in situ* Food Sample

| Food Item | Plant Part | Radioactivity (Bq/kg) |
|-----------|------------|-----------------------|
| Paddy | Grain | 128 |
| Potatoes | Tuber | 67 |
| Millet | Grain | 78 |
| Wheat | Grain | 64 |
| Bean | Seeds | 85 |
| Soyabean | Seeds | 64 |

Source : Ministry of Environment, Science and Technology and Nuclear Society of Nepal (A Study Report : "Radio Active Elements up take" by Dr. Kamal Krishna Shrestha, 2007).

Table 2.12 : Contamination of Radiation in Different Food Products

| Commodities | 2003/04 | | 2004/05 | | 2005/06 | |
|---|---------------|-----------------|---------------|-----------------|---------------|-----------------|
| | No of Samples | Radiation Bq/kg | No of Samples | Radiation Bq/kg | No of Samples | Radiation Bq/kg |
| Biscuit | 2 | 93-106 | | | | |
| Breakfast cereal | 1 | 80 | | | | |
| Bran flakes | | | | | 1 | 18 |
| Cheese | 1 | 59 | | | 1 | 31 |
| Coconut powder | | | | | 2 | 9-108 |
| Chocolate | 4 | 36-37 | | | | |
| Coke concentrate | | | | | 18 | 0-82 |
| Cream | 2 | 46-51 | | | | |
| Figaro | 1 | 32 | | | | |
| Hop pallet | | | | | 1 | 204 |
| Jam | 2 | 42-49 | | | | |
| Lentil | 4 | 42-43 | | | 4 | 61-67 |
| Malt (Barley) | 1 | 59 | 4 | 58-122 | 23 | 0-150 |
| Meat | 1 | 43 | | | | |
| Milk powder | 2 | 82-83 | | | 3 | 138-180 |
| Oil | 5 | 38-42 | | | | |
| Oil seed | 14 | 51-70 | | | | |
| Pamodaripeleti (tomato) | 1 | 34 | | | | |
| Pasta | 1 | 47 | | | | |
| Pork sausage | | | | | 1 | 25 |
| Skimmed milk power | | | 7 | 0-111 | | |
| Soft drink | 8 | 32-57 | | | | |
| Soft drink contaminate (coke, pepai co.) | | | 9 | 12-79 | | |
| Soup powder | 1 | 50 | | | 2 | 55-62 |
| Waiwai noodles | | | | | 4 | 29-111 |
| Wheat gluten | 4 | 54-96 | | | | |
| Total | 55 | | 20 | | 60 | |

Note : Maximum permissible level of radiation is 300 Bq/kg .

Source: Department of Food Technology and Quality Control, Annual Bulletins, 2004/05 and 2005/06.

Table 2.13 : Aflatoxin in Different Food Products*(in ppb)*

| Commodities | 2004/05 | | | 2005/06 | | |
|---------------|---------------------------------|--------|-----------|--------------------|--------|------|
| | Contaminated Sample 1/ Sample 2 | B1 | B2 | Contaminated S1/S2 | B1 | B2 |
| Bran flakes | | | | 1/0 | ND-137 | ND-9 |
| Beaten wheat | | | | 2/0 | ND-23 | ND |
| Corn chips | | | | 1/0 | ND-165 | ND |
| Corn flakes | | | | 1/0 | ND-137 | ND-9 |
| Dalmoth | | | | 4/0 | ND-14 | ND |
| Feed | 29 | ND-165 | ND-8 | | | |
| Meusli | | | | 1/0 | ND-137 | ND-9 |
| Maize grit | | | | 1/0 | ND-137 | ND-9 |
| Maize | 1 | ND-23 | ND | 11/2 | ND-137 | ND-9 |
| Mix spice | | | | 1/0 | ND-137 | ND-9 |
| Peanut | 1 | ND-97 | ND-3 | 11/1 | ND-14 | ND |
| Puff maize | | | | 1/0 | ND-137 | ND-9 |
| Peanut butter | 2 | ND-73 | ND- Trase | 5/0 | ND-20 | ND-6 |
| Skimmed milk | | | | 6/0 | ND-14 | ND |
| Unilitto | 6 | ND-23 | ND-3 | | | |
| Wheat | | | | 7/4 | ND | ND |
| Wheat barn | | | | 1/0 | ND | ND |
| Wheat grit | | | | 1/0 | ND-137 | ND-9 |

*ND : Not defined.**Source: Department of Food Technology and Quality Control, Annual Bulletins, 2004/05 and 2005/06.***Table 2.14 : Pesticide Residue in Commodities, 2005/06***(in ppb)*

| Commodities | Contamited S1/S2 | DDT | BHC | Parthion | Methyl Parathaion | Malathion |
|-------------|------------------|-----|-----|----------|-------------------|-----------|
| Cauliflower | 6/0 | ND | ND | ND | ND | ND |
| Radish | 4/1 | ND | ND | ND | ND | ND |
| Potato | 1/0 | ND | ND | ND | ND | ND |
| Cabbage | 2/0 | ND | ND | ND | ND | ND |
| Milk | 7/0 | ND | ND | ND | ND | ND |
| Milk powder | 3/0 | ND | ND | ND | ND | ND |
| Orange seed | 1/0 | ND | ND | ND | ND | ND |

*ND : Not defined.**Source: Department of Food Technology and Quality Control, Annual Bulletins. 2004/05 and 2005/06.*

Table 2.15 : Heavy Metals in Different Food Products, 2005/06

| Commodities | No. of sample/ code no. | Heavy metal | Light metal | pH | Other | Remarks |
|---------------------|----------------------------|-------------|-------------|-----|---|---|
| Cold drinks | 1 | As,pb,Cd | - | - | - | ND |
| Biscuit | 3 | - | Zn | - | Vit A=+ ve | Zn mix=22.6ppm |
| Flavour enhancer | 4 | Cd, pb | - | 7.1 | - | ND |
| Beer | 2 | - | Ni, Ca | - | - | Ni= not dedicated Ca, max 28.27ppm |
| Coffee | 1 | As,Cd.pb | Ni | - | - | ND |
| Floor | 2 | - | - | - | Vit A=+ ve | - |
| Milk | 5 | As,Cd.pb | - | - | - | ND |
| Rice | 18 | - | Zn | - | - | 27.23-12.99ppm |
| Soy nut | 1 | As,Cd.pb | - | - | - | ND |
| Potassium Carbonate | 1 | - | K | - | K ₂ CO ₃ =98.98% | Both contain Na ₂ CO ₃ =97.99% |
| Sodium Carbonate | 1 | - | Na | - | Na ₂ CO ₃ , NaHCO ₃ =97.98% | |
| Fiber drink | 1 | - | Fe | - | - | Fe, max=83.7ppm |

Zn= Zinc, Ca= Calcium, Cd= Cadmium, As= Arsenic, Ni= Nickel, pb= Lead, Vit A= Vitamin A k= Potassium, Na= Sodium, Fe=Iron, pbb= part per billion, ppm= part per million, pH= hydrogen-ion-concentration, ND = Not defined.

Source: Department of Food Technology and Quality Control, Annual Bulletins. 2004/05 and 2005/06.

Table 2.16 : Pesticides Registered in Nepal

| Pesticide | Number of | | | | Trade Name* 2004 |
|--------------|---------------------|-------------------------|---------------------|---------------------|---------------------|
| | Trade Name* 1997 | Registration in 1997 | Trade Name* 2002 | Trade Name* 2003 | |
| Insecticides | 46 | 7 | 207 | 213 | 213 |
| Herbicides | 9 | 5 | 22 | 23 | 23 |
| Fungicides | 17 | 7 | 71 | 71 | 71 |
| Acaricides | 1 | 1 | 2 | 2 | 2 |
| Rodenticides | | | 8 | 8 | 8 |
| Others | 5 | 4 | 2 | 2 | 2 |
| Total | 78 | 24 | 312 | 319 | 319 |

*Nepal Gazette vol.47, No. 11 (1997).+Updated Registration List of the Pesticide.

Source : Office of the Pesticide Registration and Management (Nepal Gazette Vol. 56, No. 26 part 3 Oct 30, 2006 (2063/7/13)).

Table 2.17 : Pesticide Use in Nepal, 2004-2006

| S.N | Kinds of Pesticides | Quantity of Active Ingredient (in kg) | | |
|-----|---|---|------------------|------------------|
| | | 2004 | 2005 | 2006 |
| 1 | Insecticide | | | |
| 1.1 | Organochlorine | 2472.50 | 3096.5 | 8214.50 |
| 1.2 | Organophosphate | 26911.70 | 25401.3 | 24682.65 |
| 1.3 | Carbamates | 191.13 | 1007.9 | 115.40 |
| 1.4 | Synthetic Pyrethroids | 3146.85 | 31049.9 | 2640.43 |
| 1.5 | Botanical products | 16.80 | 4.2 | 4.31 |
| 1.6 | Mixed Insecticide | 1235.00 | 1147 | 2290.35 |
| 1.7 | Others | 10987.91 | 3489 | 8605.66 |
| | Total insecticide | 44961.89 | 65195.80 | 46553.30 |
| 2 | Acaricides | 864.12 | 77.33 | 238.65 |
| 3 | Bactericides | 12.00 | 13.8 | 0.00 |
| 4 | Others (metaldehydes etc.) | 2380.12 | 2469 | 0.00 |
| 5 | Fungicide | 102004.08 | 67698.68 | 74368.45 |
| 6 | Biopesticide | 4.29 | 30.4 | 57.57 |
| 7 | Herbicide | 6186.01 | 11230.39 | 5701.70 |
| 8 | Rodenticide | 1523.00 | 1457 | 1808.00 |
| | Agri- Pesticides Total | 157935.51 | 148172.40 | 128727.67 |
| | Pesticides Used in Public Health | 1406.25 | 3300 | 2556.80 |
| | Total pesticide | 159341.76 | 151472.40 | 131284.47 |

Source: Office of the Pesticide Registration and Management.

Table 2.18 : Use of Chemical Fertilizer in Different Crops

(nutrient in mt.)

| Year | Government Sector | | | | Private Sector | Total Fertilizer | Nutrient mt / Cultivated Land Ha*100 |
|---------|-------------------|-------|--------|---------|----------------|------------------|--------------------------------------|
| | Urea | DAP | Potash | Complex | | | |
| 1999/00 | 43508 | 26154 | 308 | | 76727 | 146697 | 0.05 |
| 2000/01 | 29528 | 15633 | 58 | | 101145 | 146364 | 0.05 |
| 2001/02 | 17697 | 20645 | 1016 | | 101140 | 140498 | 0.05 |
| 2002/03 | 34449 | 33331 | 2966 | | 103636 | 174382 | 0.06 |
| 2003/04 | 7428 | 11377 | 1688 | | 118265 | 138758 | 0.04 |
| 2004/05 | 10043 | 19436 | 2332 | | 90895 | 122706 | 0.04 |
| 2005/06 | 1960 | 10857 | 478 | | 78258 | 91553 | 0.03 |
| 2006/07 | 14985 | 7437 | NA | | 65679 | 88101 | 0.03 |
| 1999/00 | 43508 | 26154 | 308 | | 76727 | 146697 | 4.74 |
| 2000/01 | 29528 | 15633 | 58 | | 101145 | 146364 | 4.73 |
| 2001/02 | 17697 | 20645 | 1016 | | 101140 | 140498 | 4.54 |
| 2002/03 | 34449 | 33331 | 2966 | | 103636 | 174382 | 5.64 |
| 2003/04 | 7428 | 11377 | 1688 | | 118265 | 138758 | 4.49 |
| 2004/05 | 10043 | 19436 | 2332 | | 90895 | 122706 | 3.97 |
| 2005/06 | 1960 | 10857 | 478 | | 78258 | 91553 | 2.96 |
| 2006/07 | 14985 | 7437 | | 2747 | 65679 | 88101 | 2.85 |

Note : The Cultivated land (3090780 Ha) based on Department of Forest Research and Survey, 2001.

Source: Ministry of Agriculture and Cooperatives and Agriculture Inputs Company Ltd.

Table 2.19 : Annual Production of Improved Seeds

(mt.)

| Seeds | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 |
|------------------|---------|---------|---------|---------|---------|---------|---------|
| Paddy | 231 | 104 | 353 | 503.7 | 546 | 643.68 | 661.17 |
| Wheat | 1656 | 2601 | 1680 | 1665.8 | 1205 | 2859 | 2450.7 |
| Maize | 7 | 52 | 20 | 19.86 | 2.11 | 10.69 | 5.81 |
| Vegetable | 2 | 36 | 2.3 | 1.48 | 1.19 | 2.77 | 8.38 |
| Lentil | 15 | 27 | 17 | 12.6 | 12.16 | 21.9 | 26 |
| Jute | 11 | 7 | 4 | 1.2 | - | 5.25 | 1.59 |
| Others (Mustard) | - | | 0.9 | 0.5 | 1.93 | 7.52 | 4.33 |

Source : National Seed Company Ltd.

Table 2.20 : Crop Species Registered in Nepal

| Crops Species | Number of Species Registered | | | | | | |
|------------------------------|------------------------------|------------|------------|------------|------------|------------|------------|
| | 1997* | 2002* | 2003* | 2004 | 2005 | 2006 | 2007 |
| Cereal crops | | | | | | | |
| Paddy | | 48 | 48 | 49 | 49 | 55 | 44 |
| Maize | | 17 | 15 | 17 | 17 | 19 | 12 |
| Wheat | | 28 | 28 | 29 | 29 | 30 | 17 |
| Barley | | 6 | 6 | 6 | 6 | 6 | 6 |
| Millet | | 3 | 3 | 3 | 3 | 3 | 3 |
| Total | 92 | 102 | 100 | 104 | 104 | 113 | 82 |
| Leguminous | | | | | | | |
| Leguminous and Pulse | 17 | 25 | 25 | 28 | 27 | 31 | 22 |
| Tuber, Root and Bulk Crops | 3 | | | | | | |
| Vegetables | 22 | 44 | 44 | 46 | 46 | 44 | 44 |
| Oil Crops | 10 | 12 | 12 | 16 | 16 | 16 | 15 |
| Soybean | 6 | | | | 7 | 7 | 7 |
| Total | 58 | 81 | 81 | 90 | 96 | 98 | 88 |
| Industrial/Cash Crops | | | | | | | |
| Jute | | 2 | 2 | 2 | 2 | 2 | 2 |
| Ginger | | 1 | 1 | 1 | 1 | 1 | 1 |
| Sugarcane | 2 | 2 | 2 | 4 | 4 | 4 | 4 |
| Tobacco | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cotton/Fiber Crops | - | 1 | 1 | 1 | 1 | 1 | 1 |
| Total | 3 | 7 | 7 | 9 | 9 | 9 | 9 |
| Grand Total | 153 | 190 | 188 | 203 | 209 | 220 | 179 |

*Nepal Gazette vol.47, No. 11 (1997).+Updated Registration List of the Pesticide.

Source: Nepal Agriculture Research Council and National Seed Committee, 1997.

Table 2.21 : Maximum Residual Limits (MRL) of Pesticides in Foodstuffs

| Pesticides | Max. Residual Limit (MRL) | Pesticides | Max. Residual Limit (MRL) |
|------------------|---------------------------|------------|---------------------------|
| Aldrin, Dieldrin | 0.01 mg/kg | Carbaryl | 1.5mg/kg |
| Chlordane | 0.02 mg/kg | DDT | Absent |
| Diazinon | 0.05 mg/kg | Dichlorvos | 1 mg/kg |

Table 2.21 : Maximum Residual Limits (MRL) of Pesticides in Foodstuffs (contd...)

| Pesticides | Max. Residual Limit (MRL) | Pesticides | Max. Residual Limit (MRL) |
|---------------------|---------------------------|--------------------------|---------------------------|
| Hydrogen Cyanide | 37.05 mg/kg | Fenitrothion | 0.02mg/kg |
| | 0.01 mg/kg | Hydrogen Phosphide | .02 mg/kg |
| Malathion | 4.00 mg/kg | Inorganic Bromide | 25 mg/kg |
| | 0.01 mg/kg | Lindane | .01 mg/kg |
| Fenithion | 0.10 mg/kg | Phosphamidon | .05 mg/kg |
| Phenthoate | 0.05 mg/kg | Carbofuran | .10 mg/kg |
| Carbendazim | 0.50 mg/kg | Dithiocarbamates | .20 mg/kg |
| Oxydemeton methyl | 0.02 mg/kg | Phorate | .05 mg/kg |
| Paraquat dichloride | 0.025 mg/kg | Trichlorfon | .05mg/ kg |
| Chlorpyrifos | 0.05 mg/kg | Decmethrin/ Deltamethrin | .50mg/kg |
| Chlorfenvinphos | 0.025 mg/kg | Monocrothphos | .025 mg/kg |
| | | Prethrins | Absent |

Source : Nepal Gazette B.S. 2057/10/23.

Table 2.22 : Small Scale Manufacturing Establishments by Region and Rural-Urban Area

| Region | Number of Establishments | | |
|---------------------------|--------------------------|--------------|---------------|
| | 1991/92 | 1999/00 | Change % |
| Development Region | | | |
| Eastern | 11635 | 11639 | 0.03 |
| Central | 21414 | 21170 | -2.1 |
| Western | 6047 | 5448 | -5.15 |
| Mid western | 5057 | 2852 | -18.95 |
| Far western | 2265 | 2562 | 2.55 |
| Rural-urban | | | |
| Rural | 11488 | 13926 | 20.95 |
| Urban | 34930 | 29745 | -44.56 |
| Nepal | 46418 | 43671 | -23.61 |

Source: Central Bureau of Statistics (Surveys of Small Manufacturing Establishments).

Table 2.23 : Manufacturing Establishments by Region and Rural-Urban Area

| Region | Number of Establishments | | | |
|---------------------------|--------------------------|-------------|-------------|-------------|
| | 1991/92 | 1996/97 | 2001/02 | 2007/08 |
| Development Region | | | | |
| Eastern | 749 | 704 | 825 | 819 |
| Central | 2747 | 2019 | 1496 | 1618 |
| Western | 439 | 519 | 583 | 612 |
| Mid western | 17 | 182 | 153 | 190 |
| Far western | 159 | 133 | 156 | 207 |
| Rural-urban | | | | |
| Rural | 1478 | 1594 | 1615 | 1871 |
| Urban | 2633 | 1963 | 1598 | 1575 |
| Total | 4111 | 3557 | 3213 | 3446 |

Source: Central Bureau of Statistics (Censuses of Manufacturing Establishments).

Chapter III

Social and Demographic Indicators

Table 3.1 : Social and Demographic Indicators

| Parameter | 1981 | 1991 | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2004/05 | 2005/06 | 2006/07 |
|--|------|------|---------|---------|---------|---------|---------|---------|---------|---------|
| Socio-economic Indicators | | | | | | | | | | |
| Households with access to improved sources of drinking water (%) | | | | | | 82 | | | | |
| Households with toilet facility (%) | | | 21.6 | | | 46.8 | | | | |
| Literacy (6+) (%) | 23.5 | 39.8 | | | | 54.1 | | | | |
| Male (%) | 34 | 56.2 | | | | 65.5 | | | | |
| Female (%) | 12 | 23.5 | | | | 42.8 | | | | |
| Adult literacy (15+) (%) | | | 40. | | | 49.2 | | | | |
| Male (%) | | | | | | 62.7 | | | | |
| Female (%) | | | | | | 34.9 | | | | |
| Labor force participation rate (LFPR) | | | | | | | | | | |
| Male participation (%) | | | | | | | | | 48.9 | |
| Female participation (%) | | | | | | | | | 68.6 | |
| Households with access to electricity (%) | | | | | | 39.8 | | | | |
| Households with radio facility (%) | | | | | | 53.1 | | | | |
| Households using solid fuels for cooking (%) | | | | | | 76.9 | | | | |
| Households with telephone line (%) | | | | | | 12.5 | | | | |
| Cellular subscribers per 100 population | | | | | | | | | 2.9 | 7.56 |
| Demographic Indicators | | | | | | | | | | |
| Crude birth rate (per 1000 pop ⁿ) | | 41.2 | 34.5 | 34.1 | 33.6 | 33.1 | 31.28 | 30.62 | 30 | 29.2 |
| Crude death rate (per 1000 pop ⁿ) | | 13.3 | 10.7 | 10.3 | 10 | 9.6 | 9.22 | 8.96 | 8.7 | 8.5 |
| Total fertility rate (per women) | | 5.6 | 4.58 | | | 4.1 | 3.7 | 3.6 | 3.5 | 3.1 |
| a)Total fertility rate (rural) | | | | | | 4.4 | | | | |
| b)Total fertility rate (urban) | | | | | | 2.1 | | | | |
| Infant mortality rate (per 1000 live births) | | 97.5 | 69.4 | 66.8 | 65.3 | 64.4 | NA | NA | NA | 48 |
| Child mortality rate (per 1000 live births) | | | 111.7 | 108.8 | 105.4 | 91.2 | NA | NA | NA | 61 |
| Life expectancy at birth (yrs) | | 54.3 | 57.5 | 58.3 | 60.8 | 59.7 | 62.2 | 62.8 | 63 | 63.7 |
| Male | | 55 | 57.8 | - | 60.8 | | 61.76 | 62.3 | 62.9 | 63.3 |
| Female | | 53.5 | 57.2 | - | 61 | | 62.5 | 63.1 | 63.7 | 64.1 |
| Annual population growth rate | 2.66 | 2.1 | | | | 2.25 | | | | |
| Maternal mortality ratio (per 1000 live births) | | 850 | 439 | | | 415 | | | | 281 |
| Median age of population | | 18.9 | | | | 20.1 | | | | |
| Male | | 18.4 | | | | 19.7 | | | | |
| Female | | 19.4 | | | | 20.5 | | | | |
| Acceptors of contraception ('000 couples) | | | | 486 | 545 | 511 | 519 | 536 | | |
| Median age at marriage | | | | | | | | | | |
| Male | | 21.4 | | | | 21.9 | | | | |
| Female | | 18.1 | | | | 19.5 | | | | |
| Other Indicators | | | | | | | | | | |
| HDI (Human development index) | | | | | 0.471 | | | 0.513 | 0.527 | 0.534 |
| HPI (Human poverty index) | | | | | 39.6 | | | | | |
| GDI (Gender related index) | | | | | 0.452 | | | | 0.452 | 0.52 |
| GEM (Gender Empowerment Measurement) | | | | | | | | | 0.351 | 0.351 |

*** Central Bureau of Statistics, Ministry of Women, Children and Social Welfare & United Nations Development Program, Gender Disaggregated Indicators, 2002.*

Source : Central Bureau of Statistics (Nepal in Figures, 2002 and 2003), NPC (10th Plan) and Nepal Telecom.

Table 3.2 : Household and Population

| Description | 1961 | 1971 | 1981 | 1991 | 2001 |
|---------------------------------------|---------|---------|---------|---------|---------|
| Number of households | 1738975 | 2084062 | 2585154 | 3328198 | 4253220 |
| Annual household growth rate | 1.57 | 1.55 | 2.15 | 2.53 | 2.45 |
| Population ('000') | 9412 | 11556 | 15023 | 18491 | 23151 |
| Average annual population growth rate | 1.64 | 2.05 | 2.62 | 2.08 | 2.25 |
| Average household size | 5.30 | 5.50 | 5.80 | 5.60 | 5.44 |

Source : Central Bureau of Statistics and United nation Fund for Population Activities (Population Monograph of Nepal, Vol. I, 2003).

Table 3.3 : Poverty Head Count Rate

| Region | Poverty Headcount Rate (P ₀) | | | Distribution of the Poor | | |
|---------------------------|--|-------------|--------------|--------------------------|--------------|----------|
| | 1995-96 | 2003-04 | Change (%) | 1995-96 | 2003-04 | Change % |
| Development Region | | | | | | |
| Eastern | 38.9 | 29.3 | -24.7 | 21.0 | 23.4 | 11.4 |
| Central | 32.5 | 27.1 | -16.6 | 26.9 | 32.2 | 19.7 |
| Western | 38.6 | 27.1 | -29.8 | 18.7 | 16.7 | -10.7 |
| Mid Western | 59.9 | 44.8 | -25.2 | 18.5 | 17.7 | -4.3 |
| Far Western | 63.9 | 41.0 | -35.8 | 14.8 | 9.9 | -33.1 |
| Ecological Belt | | | | | | |
| Mountain | 57.0 | 32.6 | -42.8 | 10.7 | 7.5 | -29.9 |
| Hill | 40.7 | 34.5 | -15.2 | 41.9 | 47.1 | 12.4 |
| Tarai | 40.3 | 27.6 | -31.5 | 47.4 | 45.4 | -4.2 |
| Residence | | | | | | |
| Urban | 21.6 | 9.6 | -55.6 | 3.6 | 4.7 | 30.6 |
| Rural | 43.3 | 34.6 | -20.1 | 96.4 | 95.3 | -1.1 |
| Nepal | 41.8 | 30.8 | -26.3 | 100.0 | 100.0 | |

Source : Central Bureau of Statistics (Nepal Living Standard Surveys, 1995/96 and 2003/04).

Table 3.4 : Poverty Gap in Rural and Urban Nepal

| Area | Poverty Gap Index (P ₁) | | | Squared Poverty Gap Index (P ₂) | | |
|--------------|-------------------------------------|-------------|---------------|---|------------|---------------|
| | 1995/96 | 2003-04 | Change (%) | 1995-96 | 2003-04 | Change (%) |
| Urban | 6.54 | 2.18 | -66.67 | 2.65 | 0.71 | -73.21 |
| Rural | 12.14 | 8.5 | -29.98 | 4.83 | 3.05 | -36.85 |
| Nepal | 11.75 | 7.55 | -35.74 | 4.67 | 2.7 | -42.18 |

Source : Central Bureau of Statistics (Nepal Living Standard Surveys, 1995/96 and 2003/04).

Table 3.5 : Status of Calorie Consumption and Malnutrition

(proportion)

| Region | Calorie Intake Shortfall (k ₀) (adult) | | Stunting (S ₀) <5 age | | Underweight (U ₀) <5 age | | Wasting (W ₀) <5 age | |
|---------------------------|--|---------------------------|--|---------------------------|--|---------------------------|--|---------------------------|
| | NLSS-II 2003/04 | Small Area Estimation CBS | Nepal Demographic and Health Survey 2006 | Small Area Estimation CBS | Nepal Demographic and Health Survey 2006 | Small Area Estimation CBS | Nepal Demographic and Health Survey 2006 | Small Area Estimation CBS |
| Development Region | | | | | | | | |
| Eastern | 0.364 | 0.376 | 0.439 | 0.476 | 0.408 | 0.434 | 0.079 | 0.091 |
| Central | 0.362 | 0.399 | 0.519 | 0.500 | 0.516 | 0.447 | 0.124 | 0.108 |
| Western | 0.267 | 0.372 | 0.498 | 0.501 | 0.436 | 0.434 | 0.068 | 0.089 |
| Mid-western | 0.418 | 0.443 | 0.515 | 0.539 | 0.473 | 0.490 | 0.073 | 0.088 |
| Far-western | 0.377 | 0.499 | 0.530 | 0.540 | 0.543 | 0.489 | 0.114 | 0.088 |
| Ecological Belt | | | | | | | | |
| Mountain | 0.400 | 0.452 | 0.586 | 0.614 | 0.473 | 0.451 | 0.062 | 0.053 |
| Hill | 0.371 | 0.418 | 0.523 | 0.524 | 0.433 | 0.414 | 0.051 | 0.059 |
| Tarai | 0.330 | 0.374 | 0.465 | 0.473 | 0.504 | 0.484 | 0.134 | 0.133 |
| Residence | | | | | | | | |
| Urban | 0.426 | 0.416 | 0.363 | 0.368 | 0.331 | 0.335 | 0.085 | 0.078 |
| Rural | 0.339 | 0.395 | 0.506 | 0.522 | 0.483 | 0.467 | 0.096 | 0.98 |
| Nepal | 0.352 | 0.398 | 0.497 | 0.504 | 0.473 | 0.452 | 0.095 | 0.096 |

Source : Central Bureau of Statistics (Nepal Living Standard Surveys, 2003/04).

Table 3.6 : Percentage Distribution of Boys and Girls Enrolled in Different Levels of Schools

(In Percent)

| Year | Girls / Boys | Pre primary | Primary (1-5) | L. Secondary (6-8) | Secondary (9-10) | Total (1-10) |
|-------------|--------------|-------------|---------------|--------------------|------------------|--------------|
| 2001 (2058) | Girls | 44.5 | 44.8 | 42.2 | 41.4 | 44.0 |
| | Boys | 55.5 | 55.2 | 57.8 | 58.6 | 56.0 |
| 2002 (2059) | Girls | 44.7 | 45.4 | 42.9 | 42.9 | 44.6 |
| | Boys | 55.3 | 54.6 | 57.1 | 57.1 | 55.4 |
| 2003 (2060) | Girls | 44.2 | 45.4 | 43.6 | 43.8 | 44.9 |
| | Boys | 55.8 | 54.6 | 56.4 | 56.2 | 55.1 |
| 2004 (2061) | Girls | 46.0 | 46.3 | 45.2 | 44.6 | 45.9 |
| | Boys | 54.0 | 53.7 | 54.8 | 55.4 | 54.1 |
| 2005 (2062) | Girls | | 47.4 | 45.7 | 45.7 | 46.9 |
| | Boys | | 52.6 | 54.3 | 54.3 | 53.1 |
| 2007-2008 | Girls | | 48.9 | | | |
| | Boys | | 51.1 | | | |

Source : Department of Education (School Level Educational Statistics at a Glance).

Table 3.7 : Gross Enrolment Rate (GER) in Different Levels of Schools

(In Percent)

| Year | Boys / Girls | Gross Enrolment Ratio (GER) | | | | |
|-------------|--------------|-----------------------------|---------------|-----------------------|------------------|--------------|
| | | Pre Primary | Primary (1-5) | Lower Secondary (6-8) | Secondary (9-10) | Total (1-10) |
| 2001 (2058) | Total | 12.8 | 124.7 | 63.2 | 43.8 | 92.6 |
| | Girls | 11.7 | 114.7 | 54.0 | 36.0 | 82.8 |
| | Boys | 13.8 | 134.1 | 72.2 | 51.8 | 102.0 |
| 2002 (2059) | Total | 19.8 | 118.4 | 57.5 | 44.8 | 87.1 |
| | Girls | 17.6 | 109.4 | 51.2 | 38.7 | 79.6 |
| | Boys | 22.0 | 127.1 | 63.4 | 50.7 | 94.3 |
| 2003 (2060) | Total | | 126.7 | 60.0 | 46.4 | 91.3 |
| | Girls | | 117.1 | 54.3 | 41.3 | 83.9 |
| | Boys | | 136.0 | 65.2 | 51.5 | 98.4 |
| 2004 (2061) | Total | 39.4 | 130.7 | 80.3 | 50.4 | 100.2 |
| | Girls | 37.3 | 124.2 | 73.9 | 45.2 | 93.8 |
| | Boys | 41.4 | 137.0 | 86.4 | 55.4 | 106.4 |
| 2005 (2062) | Total | 69.9 | 145.4 | 76.0 | 59.3 | |
| | Girls | 66.6 | 141.8 | 68.2 | 45.5 | |
| | Boys | 73.1 | 148.8 | 84.0 | 53.0 | |
| 2006 (2063) | Total | 41.4 | 138.8 | 71.5 | 56.7 | |
| | Girls | 40.9 | 138.4 | 65.4 | 53.1 | |
| | Boys | 41.9 | 139.2 | 77.9 | 60.2 | |
| 2007-2008 | Total | 60.2 | 138.5 | 78.8 | 55.9 | |
| | Girls | 56.8 | 139.6 | 75.9 | 52.4 | |
| | Boys | 63.4 | 137.6 | 81.6 | 59.3 | |

Source : Department of Education (School Level Educational Statistics at a Glance).

Table 3.8 : Net Enrolment Rate (NER) in Different Levels of Schools*(In Percent)*

| Year | Boy / Girl | Net Enrolment Ratio (NER) | | | | |
|-------------|------------|---------------------------|---------------|-----------------------|------------------|--------------|
| | | Pre-primary / ECD | Primary (1-5) | Lower Secondary (6-8) | Secondary (9-10) | Total (1-10) |
| 2001(2058) | Total | 10.3 | 81.1 | 39.4 | 25.5 | 59.2 |
| | Girls | 9.5 | 75.1 | 33.7 | 20.9 | 53.2 |
| | Boys | 11.1 | 86.9 | 45.0 | 30.2 | 65.0 |
| 2002(2059) | Total | | 82.3 | 40.4 | 27.5 | 60.1 |
| | Girls | | 76.8 | 35.8 | 23.9 | 54.7 |
| | Boys | | 88.7 | 44.7 | 31.0 | 65.2 |
| 2003(2060) | Total | | 83.5 | 42.9 | 29.5 | 61.1 |
| | Girls | | 77.5 | 38.7 | 26.3 | 56.2 |
| | Boys | | 89.4 | 46.8 | 32.7 | 65.7 |
| 2004(2061) | Total | | 84.2 | 43.9 | 32.0 | 62.1 |
| | Girls | | 78.0 | 40.2 | 28.8 | 57.1 |
| | Boys | | 90.1 | 47.6 | 35.2 | 66.9 |
| 2005(2062) | Total | | 86.8 | 46.5 | 32.4 | |
| | Girls | | 83.4 | 43.1 | 29.2 | |
| | Boys | | 90.1 | 49.8 | 35.5 | |
| 2006(2063) | Total | | 87.4 | 52.3 | 34.7 | |
| | Girls | | 85.5 | 47.8 | 32.4 | |
| | Boys | | 89.3 | 57.1 | 37.0 | |
| 2007-2008 | Total | 60.2 | 89.1 | 52.9 | 35.3 | |
| | Girls | | 87.4 | 49.6 | 32.8 | |
| | Boys | | 90.7 | 56.1 | 37.7 | |

Source: Department of Education (School Level Educational Statistics at a Glance).

Table 3.9 : Inter-Zonal Life-Time Migrants, Nepal, 1981

| Place of Birth | Place of Enumeration | | | | % Out-Migration | Net-Migration |
|-----------------------|----------------------|----------------|----------------|----------------|-----------------|---------------|
| | Mountain | Hill | Tarai | Total | | |
| Mountain | - | 134,254 | 162,832 | 297,086 | 32.0 | -261,467 |
| Hill | 33,423 | - | 561,211 | 594,634 | 64.0 | -424,711 |
| Tarai | 2,196 | 561,211 | - | 37,865 | 4.1 | 686,178 |
| Total | 35,619 | 169,923 | 724,043 | 929,585 | 100.0 | |
| % In-migration | 3.8 | 18.3 | 77.9 | 100.0 | | |

Source : Central Bureau of Statistics, 2002.

Table 3.10 : Inter-Zonal Life-Time Migrants, Nepal, 1991

| Place of Birth | Place of Enumeration | | | | % Out-Migration | Net-Migration |
|-----------------------|----------------------|----------------|------------------|------------------|-----------------|---------------|
| | Mountain | Hill | Tarai | Total | | |
| Mountain | - | 76,503 | 121,826 | 198,329 | 16.1 | -161,655 |
| Hill | 32,003 | - | 895,888 | 927,891 | 75.5 | -753,923 |
| Tarai | 4,671 | 97,465 | - | 102,136 | 8.3 | 915,578 |
| Total | 36,674 | 173,968 | 1,017,714 | 1,228,356 | 100.0 | |
| % In-migration | 3.0 | 14.2 | 82.9 | 100.0 | | |

Source : Central Bureau of Statistics, 2002.

Table 3.11 : Inter-Zonal Migrants for Both Sexes, Nepal, 2001

| Origin | Destination | | | | % Out-Migration | Net-Migration |
|----------------|-------------|---------|-----------|-----------|-----------------|---------------|
| | Mountain | Hill | Tarai | Total | | |
| Nepal | | | | | | |
| Mountain | - | 125,597 | 169,825 | 295,422 | 17.1 | -255,103 |
| Hill | 33,895 | - | 1,157,035 | 1,190,930 | 68.9 | -830,759 |
| Tarai | 6,424 | 234,574 | - | 240,998 | 14.0 | 1,085,862 |
| Total | 40,319 | 360,171 | 1,326,860 | 1,727,350 | 100.0 | |
| % In-migration | 2.3 | 20.9 | 76.8 | 100.0 | | |
| Male | | | | | | |
| Mountain | - | 57,170 | 84,783 | 141,953 | 16.8 | -127,610 |
| Hill | 10,822 | - | 567,513 | 578,335 | 68.4 | -400,001 |
| Tarai | 3,521 | 121,164 | - | 124,685 | 14.8 | 527,611 |
| Total | 14,343 | 178,334 | 652,296 | 844,973 | 100.0 | |
| % In-migration | 1.7 | 21.1 | 77.2 | 100.0 | | |
| Female | | | | | | |
| Mountain | - | 68,428 | 85,040 | 153,468 | 17.4 | -127,511 |
| Hill | 23,061 | - | 589,528 | 612,589 | 69.4 | -430,746 |
| Tarai | 2,896 | 113,415 | - | 116,311 | 13.2 | 558,257 |
| Total | 25,957 | 181,843 | 674,568 | 882,368 | 100.0 | |
| % In-migration | 2.9 | 20.6 | 76.4 | 100.0 | | |

Source : Central Bureau of Statistics, 2002.

Table 3.12 : Statistics on Crime, Corruption, Traffic Accidents and Hard Drug Users

| Cases | Number | | | | | | | |
|------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 |
| Crime (Case Number)* | 17819 | 29867 | 36763 | 26586 | 9320 | 11,329 | 10413 | 11672 |
| Corruption (Case Number)+ | 2522 | 3966 | 3732 | 4759 | 4324 | 3564 | 2732 | NA |
| Traffic Accident* | | | 4030 | 5532 | 3868 | 4545 | 916 | 1483 |
| Total Number of Hard Drug Users ** | | | | | | | 46309 | |

Source : * Police Headquarter, ** Central Bureau of Statistics (Hard Drug Users in Nepal, Some Statistical Facts, 2063) and + Commission for Investigation Abuse Authority.

Chapter IV

Air and Climate

Table 4.1 : Annual Mean Temperature by Station

| S. N. | District/Stations Name | Latitude | Longitude | Elevation (masl) | Mean Temperature (°C) | | | | | |
|-------|--------------------------------|----------|-----------|------------------|-----------------------|------|------|------|------|------|
| | | | | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 1 | Banke, Nepalganj | 28° 06' | 81° 40' | 165 | 25.1 | 25.5 | 22.6 | 25.1 | 25.5 | 25.6 |
| 2 | Bara, Simara Airport | 27° 10' | 84° 59' | 130 | 24.2 | 24.2 | 23.8 | 24.0 | 24.5 | 24.4 |
| 3 | Bhaktapur, Nagarkot | 27° 42' | 84° 59' | 2163 | 9.5 | 9.4 | 9.9 | 8.8 | 9.2 | 8.6 |
| 4 | Bhojpur, Bhojpur | 27° 11' | 85° 13' | 1595 | 9.7 | 17.9 | 13.7 | NA | NA | NA |
| 5 | Chitawan, Rampur | 27° 37' | 84° 25' | 256 | 24.6 | 24.7 | 24.4 | 24.5 | 24.7 | 24.9 |
| 6 | Dadeldhura, Dadeldhura | 29° 18' | 80° 35' | 1848 | 16.7 | 16.3 | 16.6 | 16.8 | 16.5 | 17.4 |
| 7 | Dailekh, Dailekh | 28° 51' | 81° 43' | 1402 | 16.1 | 18.8 | 18.8 | 19.2 | 18.9 | 17.9 |
| 8 | Dang , Ghorahi | 28° 03' | 82° 30' | 634 | 20.8 | 21.5 | 21.5 | 21.9 | 22.4 | 22.5 |
| 9 | Darchula, Darchula | 29° 51' | 80° 34' | 1097 | 20.6 | 20.5 | 20.7 | 21.0 | 20.1 | 21.0 |
| 10 | Dhankuta, Dhankuta | 26° 59' | 87° 21' | 1210 | 19.9 | 19.8 | 19.8 | 19.7 | 19.9 | 20.4 |
| 11 | Dolakha, Jiri | 27° 38' | 86° 14' | 2003 | 14.6 | 14.1 | 14.3 | 14.3 | 14.2 | 14.9 |
| 12 | Dolpa, Dunai | 28° 56' | 82° 55' | 2058 | 19.9 | 15.2 | 16.5 | 15.7 | 13.8 | NA |
| 13 | Doti, Dipayal | 29° 15' | 80° 57' | 617 | 23.8 | 23.5 | 23.5 | 23.8 | 22.6 | 22.9 |
| 14 | Gorkha, Gorkha | 28° 00' | 84° 37' | 1097 | 13.2 | 21.2 | 20.8 | 17.1 | 20.2 | 22.7 |
| 15 | Gulmi, Tamghas | 28° 04' | 83° 15' | 1530 | 17.7 | 17.5 | 17.1 | 17.6 | 17.6 | 18.1 |
| 16 | Ilam, Ilam Tea State | 26° 55' | 87° 54' | 1300 | 19.5 | 18.7 | 15.7 | NA | 16.8 | 20.2 |
| 17 | Dhanusha, Janakpur Airport | 26° 43' | 85° 58' | 90 | 25.0 | 25.2 | 24.6 | 24.8 | 25.2 | 25.3 |
| 18 | Jhapa, Kankai | 26° 35' | 87° 54' | 143 | 24.5 | 24.3 | 24.0 | 24.5 | 25.0 | 25.0 |
| 19 | Mustang, Jomsom | 28° 47' | 83° 43' | 2744 | 11.9 | 11.8 | 11.6 | 12.1 | 11.8 | 12.3 |
| 20 | Jumla, Jumla | 29° 17' | 82° 14' | 2300 | 13.3 | 12.9 | 13.1 | 13.4 | 12.9 | 13.9 |
| 21 | Kailali, Dhangadi | 28° 41' | 80° 41' | 170 | 15.0 | 15.3 | 15.0 | 14.7 | 15 | 15.1 |
| 22 | Kanchanpur, Mahendra Nagar | 29° 02' | 80° 13' | 176 | 23.8 | 24.1 | 21.1 | 23.8 | 24.2 | 24.3 |
| 23 | Kaski, Lumle | 28° 18' | 84° 00' | 1740 | 16.9 | 16.7 | 16.5 | 16.2 | 16.2 | 20.7 |
| 24 | Kaski, Pokhara Airport | 28° 13' | 83° 48' | 827 | 21.6 | 21.5 | 21.5 | 21.6 | 21.4 | 22.0 |
| 25 | Kathmandu, Kathmandu Airport | 27° 42' | 85° 22' | 1336 | 19.4 | 19.0 | 19.2 | 19.2 | 19.4 | 19.8 |
| 26 | Lamjung, Khudibazar | 28° 17' | 84° 22' | 823 | NA | 23.2 | 23.0 | 23.2 | 23.7 | 24.6 |
| 27 | Makawanpur, Hetauda | 27° 25' | 85° 03' | 474 | 23.3 | 22.3 | 22.5 | 22.3 | 23.1 | 23.7 |
| 28 | Manang, Chame | 28° 33' | 84° 14' | 2680 | 11.3 | 11.4 | NA | 11.5 | 10.8 | 11.6 |
| 29 | Morong, Biratnagar Airport | 26° 29' | 87° 16' | 72 | 24.9 | 24.8 | 24.3 | 24.5 | 25.2 | 25.2 |
| 30 | Nawalparasi, Dumkauli | 27° 41' | 84° 13' | 154 | 24.5 | 24.5 | 24.2 | 24.4 | 24.8 | 24.9 |
| 31 | Nuwakot, Nuwakot | 27° 55' | 85° 10' | 1003 | 22.5 | 22.2 | NA | NA | 21.5 | 22.5 |
| 32 | Okhaldhunga, Okhaldhunga | 27° 19' | 86° 30' | 1720 | 18.0 | 16.6 | 17.5 | 17.4 | 17.4 | 18.0 |
| 33 | Palpa, Tansen | 27° 52' | 83° 33' | 1343 | NA | 18.8 | 14.1 | 20.5 | 20.1 | 21.0 |
| 34 | Rautahat, Gaur | 27° 11' | 85° 10' | 244 | 25.9 | 25.5 | 24.8 | 24.7 | 24.5 | 26.1 |
| 35 | Rupandehi, Bhairahawa Airport | 27° 31' | 83° 26' | 109 | 24.6 | 24.9 | 24.5 | 24.8 | 25.2 | 25.3 |
| 36 | Saptari Rajbiraj | 26° 33' | 86° 45' | 91 | 21.8 | 24.8 | 22.0 | 23.8 | 25.7 | 25.2 |
| 37 | Samkhuwasabha, Chainpur (East) | 27° 17' | 87° 20' | 1329 | 19.2 | 18.5 | 19.3 | 18.1 | 17.9 | 18.0 |
| 38 | Sunsari, Dharan | 26° 49' | 87° 17' | 444 | 24.5 | 24.3 | 23.7 | 24.1 | 23.5 | 25.0 |
| 39 | Surkhet, Birendranagar | 28° 36' | 81° 37' | 720 | 21.9 | 21.9 | 21.7 | 22.0 | 22.0 | 22.4 |
| 40 | Syangja, Syangja | 28° 06' | 83° 53' | 868 | 21.0 | 19.0 | 20.9 | 21.1 | 20.7 | 21.5 |
| 41 | Tanahaun, Khairanitar | 28° 10' | 84° 00' | 823 | NA | 23.2 | 23.0 | 23.2 | 23.7 | 24.6 |
| 42 | Taplejung, Taplejung | 27° 21' | 87° 40' | 1732 | 16.1 | 16.3 | 16.4 | 16.3 | 16.9 | 17.2 |

NA- Not Available; masl – meter above sea level

Source: Department of Hydrology and Meteorology.

Table 4.2 : Precipitation by District and Station

(precipitation in mm)

| S. N. | District / Station Name | Latitude | Longitude | Elevation (masl) | 1971-2000 | | | | |
|-------|-------------------------------|----------|-----------|------------------|-----------|---------|--------|-------------|--------------|
| | | | | | Annual | Monsoon | Winter | Pre Monsoon | Post Monsoon |
| 1 | Banke, Nepalganj | 28° 06' | 81° 40' | 165 | 1350.8 | 1137.8 | 60.7 | 93.1 | 59.2 |
| 2 | Bara, Simara Airport | 27° 10' | 84° 59' | 130 | 1806.2 | 1488.7 | 41.4 | 193.4 | 82.6 |
| 3 | Chatara, Sunsari | 26° 49' | 87° 10' | 183 | 2137.9 | 1694.9 | 40.1 | 243.5 | 159.4 |
| 4 | Chitawan, Rampur | 27° 37' | 84° 25' | 256 | 1995.8 | 1634.5 | 48.1 | 221.1 | 92.1 |
| 5 | Dadeldhura, Dadeldhura | 29° 18' | 80° 35' | 1848 | 1383.7 | 1003.8 | 131.4 | 200.7 | 47.9 |
| 6 | Dang , Ghorahi | 28° 03' | 82° 30' | 634 | 1600.8 | 1341.9 | 57.7 | 127.2 | 74 |
| 7 | Dhankuta, Dhankuta | 26° 59' | 87° 21' | 931 | 1008.7 | 722.5 | 38.7 | 182.6 | 64.8 |
| 8 | Dhanusha, Janakpur | 26° 43' | 85° 58' | 90 | 1395.6 | 1137.4 | 34.7 | 150.4 | 73.1 |
| 9 | Doti, Dipayal | 29° 15' | 80° 57' | 617 | 1145.2 | 802.4 | 122.8 | 172.4 | 47.6 |
| 10 | Gorkha, Gorkha | 28° 00' | 84° 37' | 1097 | 1779.6 | 1352.3 | 57.6 | 305.4 | 64.3 |
| 11 | Gulmi, Tamghas | 28° 04' | 83° 15' | 1530 | 1954.3 | 1585.2 | 85.1 | 216.3 | 67.7 |
| 12 | Ilam, Ilam Tea State | 26° 55' | 87° 54' | 1300 | 1713 | 1370.5 | 37.1 | 227.2 | 78.3 |
| 13 | Jhapa, Kankai (Gaida) | 26° 35' | 87° 54' | 143 | 2903.6 | 2391.2 | 39.2 | 312.0 | 161.2 |
| 14 | Mustang, Jomsom | 28° 47' | 83° 43' | 2744 | 257.7 | 135.4 | 24.3 | 58.8 | 39.1 |
| 15 | Jumla, Jumla | 29° 17' | 82° 14' | 2300 | 843.6 | 544.3 | 88.1 | 162.1 | 49.1 |
| 16 | Kailali, Dhangadi | 28° 41' | 80° 41' | 170 | 1792.5 | 1561.7 | 68.5 | 109.9 | 52.4 |
| 17 | Kaski, Lumle | 28° 18' | 83° 48' | 1740 | 5360.4 | 4541.4 | 100.5 | 481.8 | 236.7 |
| 18 | Kaski, Pokhara | 28° 13' | 84° 00' | 827 | 3951.5 | 3126.6 | 79.1 | 550.4 | 195.4 |
| 19 | Kathmandu Airport | 27° 42' | 85° 22' | 1336 | 1439.7 | 1125.6 | 46.3 | 203.3 | 64.5 |
| 20 | Lamjung, Khudibazar | 28° 17' | 84° 22' | 823 | 3364.5 | 2750.0 | 95.6 | 395.8 | 123.0 |
| 21 | Makawanpur, Hetauda | 27° 25' | 85° 03' | 474 | 2331.3 | 1917.1 | 52.4 | 258.4 | 103.3 |
| 22 | Manang, Chame | 28° 33' | 84° 14' | 2680 | 935.3 | 575.7 | 102.7 | 183.6 | 73.2 |
| 23 | Morang, Biratnagar | 26° 29' | 87° 16' | 72 | 1881.1 | 1522.5 | 31.4 | 227.6 | 99.6 |
| 24 | Nawalparasi, Dumkauli | 27° 41' | 84° 13' | 154 | 2289.4 | 1907.8 | 51.5 | 240.9 | 89.2 |
| 25 | Bara, Nijgadh | 27° 11' | 85° 10' | 244 | 2033.0 | 1673.0 | 40.1 | 216.8 | 103.0 |
| 26 | Nuwakot, Nuwakot | 27° 55' | 85° 10' | 1003 | 1978.0 | 1639.1 | 51.0 | 208.9 | 78.9 |
| 27 | Okhaldhunga, Okhaldhunga | 27° 19' | 86° 30' | 1720 | 1755.2 | 1401.6 | 38.1 | 233.4 | 82.1 |
| 28 | Palpa , Tansen | 27° 52' | 83° 32' | 1067 | 1520.7 | 1274.1 | 71.0 | 130.4 | 45.3 |
| 29 | Parbat, Kushma | 28° 13' | 83° 42' | 891 | 2498 | 2044.4 | 68.7 | 269.1 | 99.1 |
| 30 | Dailekh, Dailekh | 28° 51' | 81° 43' | 1402 | 1838.5 | 1504.1 | 96.6 | 182.4 | 55.4 |
| 31 | Ramechhap, Jiri | 27° 38' | 86° 14' | 2003 | 2266 | 1815.4 | 52.1 | 307.9 | 90.6 |
| 32 | Rupandehi, Bhairahawa Airport | 27° 31' | 83° 26' | 109 | 1673.1 | 1444.6 | 44.8 | 105.7 | 78.0 |
| 33 | Sankhuwasava, Chainpur | 27° 17' | 87° 20' | 1329 | 1435 | 982.3 | 36.6 | 334.3 | 81.8 |
| 34 | Saptari, Rajbiraj | 26° 33' | 86° 45' | 91 | 1493.1 | 1231.4 | 35.1 | 157.1 | 69.5 |
| 35 | Sindhuli, Sindhuligadhi | 27° 17' | 85° 58' | 1463 | 2827.2 | 2232.2 | 50.7 | 368.8 | 175.6 |
| 36 | Surkhet, Birendranagar | 28° 36' | 81° 37' | 720 | 1603.1 | 1312.6 | 96.2 | 139.2 | 55.1 |
| 37 | Syangja, Syangja | 28° 06' | 83° 53' | 868 | 2888.8 | 2281.1 | 73.4 | 418.8 | 115.5 |
| 38 | Tanahu, Khairanitar | 28° 02' | 84° 06' | 500 | 2328.8 | 1707.3 | 67.1 | 464.0 | 90.4 |
| 39 | Taplejung, Taplejung | 27° 21' | 87° 40' | 1732 | 2010.9 | 1401.7 | 56.0 | 447.5 | 105.7 |

Note : 30 years in normal.

Source: Department of Hydrology and Meteorology

Table 4.3 : Annual Rainfall by Station

(rain fall in mm)

| S. N. | District/Station Name | Latitude | Longitude | Elevation (masl) | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-------|---------------------------|----------|-----------|------------------|------|------|------|------|------|-------|------|------|------|------|-------|-------|
| 1 | Banke, Nepalganj | 28° 06' | 81° 40' | 165 | 1394 | 1480 | NA | 1912 | 1467 | 1485 | 1279 | 967 | NA | 929 | 1184 | 1242 |
| 2 | Bara, Simara Airport | 27° 10' | 84° 59' | 130 | 1339 | 1552 | 1744 | 2797 | 2046 | 2123 | 2297 | 1949 | 2150 | 1965 | 1864 | 1861 |
| 3 | Bhaktapur, Nagarkot | 27° 42' | 84° 59' | 2163 | 2322 | 2353 | 2134 | 1924 | 2144 | 1875 | 1850 | 2321 | 2260 | 1807 | 1797 | 1669 |
| 4 | Bhojpur, Bhojpur | 27° 11' | 85° 13' | 1595 | 1569 | 1041 | NA | 1172 | 1528 | 932 | 1304 | 1178 | NA | NA | NA | NA |
| 5 | Chitawan, Rampur | 27° 37' | 84° 25' | 256 | 1962 | 1784 | 2141 | 2645 | 2542 | 2050 | 2340 | 2644 | 2694 | 2042 | 1732 | 1997 |
| 6 | Dadeldhura, Dadeldhura | 29° 18' | 80° 35' | 1848 | 1663 | 1255 | 1375 | 1811 | 791 | 1138 | 1322 | 1293 | 1391 | 1194 | 1102 | 940.8 |
| 7 | Dailekh, Dailekh | 28° 51' | 81° 43' | 1402 | 1896 | 3098 | 1808 | NA | 1597 | 1290 | NA | 1327 | 1999 | 1281 | 1792 | 1784 |
| 8 | Dang , Ghorahi | 28° 03' | 82° 30' | 634 | 1658 | 1914 | 1476 | 1640 | 1932 | 1916 | 1633 | 1364 | 1700 | 1318 | 1557 | 1266 |
| 9 | Darchula, Dharchula | 29° 51' | 80° 34' | 1097 | 2551 | 2220 | 2398 | 2884 | 2455 | 2888 | 2273 | 2183 | 2864 | 2616 | 2281 | 2386 |
| 10 | Dhankuta, Dhankura | 26° 59' | 87° 21' | 1210 | 1074 | 904 | 979 | 1214 | 1161 | 795.5 | 959 | 1090 | 1086 | 951 | 1156 | 859.3 |
| 11 | Ramechhap, Jiri | 27° 38' | 86° 14' | 2003 | 2526 | 2235 | NA | NA | NA | 2625 | NA | NA | 2839 | 2613 | 2015 | 1980 |
| 12 | Dolpa, Dunai | 28° 56' | 82° 55' | 2058 | NA | 641 | 369 | 363 | 417 | 216 | 174 | NA | 273 | 203 | 93.5 | 266 |
| 13 | Doti, Dipayal | 29° 15' | 80° 57' | 617 | 1119 | 1039 | 1210 | 1371 | 868 | 1292 | 998 | 1025 | 1261 | 1034 | 986.5 | 907.3 |
| 14 | Gorkha, Gorkha | 28° 00' | 84° 37' | 1097 | NA | 1936 | NA | 728 | NA | NA | 1872 | 1743 | 1729 | 1613 | 1277 | 1114 |
| 15 | Gulmi, Tamghas | 28° 04' | 83° 15' | 1530 | 1661 | 2256 | 1912 | 2813 | 1981 | 2189 | 1974 | 1399 | 2314 | 1234 | 1570 | 1457 |
| 16 | Ilam, Ilam Tea State | 26° 55' | 87° 54' | 1300 | 2108 | 1682 | 1918 | 2055 | 2078 | 1545 | 1331 | 1542 | 2001 | NA | DNA | 1119 |
| 17 | Dhanusa, Janakpur Airport | 26° 43' | 85° 58' | 90 | 1307 | 1361 | 1657 | 2055 | 1841 | 1584 | 1775 | 1591 | 2008 | 2199 | 1307 | 1292 |
| 18 | Jhapa, Kankai | 26° 35' | 87° 54' | 143 | 1638 | 2836 | 2333 | 3761 | 3038 | 2583 | 2440 | 2311 | 2748 | 2451 | 1832 | 1697 |
| 19 | Mustang, Jomsom | 28° 47' | 83° 43' | 2744 | 432 | 377 | NA | 201 | 255 | 189 | 240 | 308 | 319 | 230 | 309.3 | 301.5 |
| 20 | Jumla, Jumla | 29° 17' | 82° 14' | 2300 | 829 | 833 | 774 | 834 | 676 | 887 | 728 | 842 | 843 | 685 | 669.5 | 747.7 |
| 21 | Kailali, Dhangadi | 28° 41' | 80° 41' | 170 | 2132 | 1732 | 1984 | 2385 | 1757 | 2132 | 1485 | 1626 | 2309 | 1418 | 1742 | 1448 |
| 22 | Kanchanpur, Mahendranagar | 29° 03' | 80° 22' | 176 | 2135 | 1643 | 1626 | 2446 | NA | 2343 | 1407 | 2006 | NA | NA | 1680 | 1056 |

Table 4.3 : Annual Rainfall by Station (contd...)

(rain fall in mm)

| S. No. | Station | Latitude | Longitude | Elevation (masl) | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------|------------------------------|----------|-----------|---------------------|------|------|---------------|------|------|------|------|------|------|------|------|-------|
| 23 | Kaski, Lumle | 28° 18' | 84° 00' | 1740 | 6561 | 5561 | 5335 | 6217 | 5953 | 6238 | 5936 | 5730 | 6310 | 6096 | 4923 | 4162 |
| 24 | Kaski, Pokhara Airport | 28° 13' | 83° 48' | 827 | 4855 | 3957 | 3529 | 4879 | 4687 | 4785 | 4512 | 4484 | 4362 | 4129 | 2967 | 3024 |
| 25 | Kathmandu, Kathmandu Airport | 27° 42' | 85° 22' | 1336 | 1674 | 1600 | 1528 | 1771 | 1681 | 1407 | 1621 | 1871 | 1740 | 1583 | 1236 | 1391 |
| 26 | Lamjung, Khudibazar | 28° 17' | 84° 22' | 823 | 3486 | 4436 | NA | 3564 | 3436 | 3545 | 3140 | 3304 | 3849 | 3849 | 2838 | 2852 |
| 27 | Makawanpur, Hetauda | 27° 25' | 85° 03' | 474 | 2282 | 2124 | 2496 | 2919 | 3111 | 2535 | 2680 | 3323 | 2998 | 3103 | 2411 | 2114 |
| 28 | Manang, Chame | 28° 33' | 84° 14' | 2680 | 1320 | 1221 | 732 | 751 | 593 | 540 | 530 | 909 | NA | 974 | 1174 | 947.2 |
| 29 | Morang, Biratnagar Airport | 26° 29' | 87° 16' | 72 | 1667 | 1943 | 1673 | 2677 | 2036 | 2292 | 2279 | 1923 | 2108 | 2144 | 1596 | 1300 |
| 30 | Nawalparasi, Dumkauli | 27° 41' | 84° 13' | 154 | 2659 | 2277 | 1877 | 2583 | 2616 | 2612 | 2979 | 2591 | 3280 | 2611 | 2213 | 2117 |
| 31 | Nuwakot, Nuwakot | 27° 55' | 85° 10' | 1003 | 1695 | 1765 | 1897 | 2232 | 2343 | 2513 | 2484 | 2111 | 2216 | 2007 | 1589 | 1255 |
| 32 | Okhaldhunga, Okhaldhunga | 27° 19' | 86° 30' | 1720 | 1713 | 1803 | 1994 | 1926 | 2027 | 1470 | 2192 | 2001 | 1716 | 1619 | 1902 | 1696 |
| 33 | Palpa , Tansen | 27° 52' | 83° 33' | 1343 | 1704 | 1634 | Partly closed | | | | | | 1799 | 1509 | 1294 | 1130 |
| 34 | Bara, Nijghad | 27° 11' | 85° 10' | 244 | 2051 | NA | 1797 | 1876 | 1810 | 2215 | 2130 | 2524 | 2326 | 2929 | NA | NA |
| 35 | Rupandehi, Bhairahawa | 27° 31' | 83° 26' | 109 | 1700 | 1979 | 1437 | 2410 | 2064 | 1504 | 2016 | 1269 | 1953 | 1524 | 1768 | 1214 |
| 36 | Samkhuwasabha, Chinpur | 27° 17' | 87° 20' | 1329 | 165 | 1523 | 1200 | 1507 | 1658 | 1128 | 1733 | 1683 | 1745 | 1392 | 1332 | 1521 |
| 37 | Saptari, Rajbiraj | 26° 33' | 86° 45' | 91 | 1130 | 1777 | 1528 | 1706 | 1663 | 1997 | 1827 | 2024 | 1763 | 2185 | NA | NA |
| 38 | Sindhuli, Sindhilighadi | 27° 17' | 88° 58' | 1463 | 2471 | 2598 | 2317 | 2919 | 3248 | 2706 | 2787 | 2919 | 2617 | NA | NA | NA |
| 39 | Sunsari, Dharan | 26° 49' | 87° 17' | 444 | 210 | 2065 | 1922 | 2139 | 1941 | 2263 | 2616 | 2214 | 2325 | 2326 | 2027 | 1751 |
| 40 | Surkhet, Birendranagar | 28° 36' | 81° 37' | 720 | 1514 | 1431 | 1710 | 1754 | 1708 | 1900 | 1722 | 1538 | 1849 | 1425 | 1810 | 1485 |
| 41 | Syangja, Syangja | 28° 06' | 83° 53' | 868 | 3471 | 2999 | 2806 | 2896 | 3659 | 3122 | 3260 | 3861 | 3328 | 3114 | 2249 | 2675 |
| 42 | Tanahaun, Khairanitar | 28° 10' | 84° 00' | 823 | 2689 | 208 | 2398 | 2896 | 2645 | 2439 | 2275 | 3058 | 2056 | 2113 | 2089 | 2202 |
| 43 | Taplejung, Taplejung | 27° 21' | 87° 40' | 1732 | 2159 | 2161 | 2094 | 2101 | 1984 | 1874 | 1912 | 2173 | 2505 | 1746 | 1795 | 2147 |

Source: Department of Hydrology and Meteorology.

Table 4.4 : Monthly Average of PM₁₀ for 2003-2007 in Different Areas

(micro-gm/m³)

| Year/ Month | Roadside Stations | | | | | | | | Residential Station | | | | Valley Background Station | | | | Urban Background Stations | | | | | | | |
|-----------------------|-------------------|------------|------------|------------|------------|------------|------------|------------|---------------------|------------|------------|------------|---------------------------|-----------|-----------|-----------|---------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Putalisadak | | | | Patan | | | | Thamel | | | | Machhegau | | | | Bhaktapur | | | | Kirtipur | | | |
| | 2004 | 2005 | 2006 | 2007 | 2004 | 2005 | 2006 | 2007 | 2004 | 2005 | 2006 | 2007 | 2004 | 2005 | 2006 | 2007 | 2004 | 2005 | 2006 | 2007 | 2004 | 2005 | 2006 | 2007 |
| January | 285 | 271 | 336 | 339 | 245 | 257 | 277 | 248 | 214 | 210 | 221 | 201 | 57 | 54 | 70 | 82 | 184 | 140 | 171 | 133 | 109 | 101 | 113 | 123 |
| February | 246 | 264 | | 255 | 235 | 265 | | 188 | 201 | 164 | | 140 | 70 | NA | | 66 | 194 | 134 | | 113 | 117 | 82 | | 92 |
| March | 287 | 174 | 358 | 309 | 280 | 238 | 245 | 179 | 224 | 147 | 178 | 132 | 108 | 50 | 73 | 55 | 219 | 124 | 211 | 107 | 151 | 83 | 102 | 79 |
| April | 241 | NA | 249 | 282 | 230 | 285 | 207 | 192 | 161 | 192 | 136 | 137 | 91 | 102 | 73 | 67 | 154 | 192 | 151 | 114 | 122 | 121 | 65 | 86 |
| May | 230 | 238 | 233 | 167 | 211 | 215 | 126 | 187 | 153 | 120 | 98 | 120 | 79 | 54 | 43 | 51 | 137 | 109 | 82 | 77 | 99 | 70 | 59 | 66 |
| June | 185 | 184 | 225 | 255 | 161 | 211 | 116 | 225 | 67 | 108 | 105 | 144 | 48 | 52 | 49 | 42 | 80 | n/a | 73 | 61 | 49 | 52 | 53 | 62 |
| July | 113 | 118 | 125 | 147 | 136 | 177 | 88 | 128 | 61 | 52 | 51 | 81 | 29 | 15 | 17 | 22 | 36 | 30 | 26 | 43 | 29 | 20 | 20 | 31 |
| August | 117 | 118 | 115 | 110 | 139 | 113 | 95 | 96 | 54 | 56 | 41 | 53 | 16 | 19 | 15 | 17 | 28 | 32 | 26 | 28 | 22 | 29 | 20 | 20 |
| September | 117 | 151 | 123 | 110 | 123 | 145 | 84 | 94 | 67 | 69 | 59 | 50 | 24 | 21 | 17 | 19 | 42 | 47 | 37 | 28 | 35 | 35 | 18 | 24 |
| October | 147 | 137 | 202 | 158 | 137 | 116 | 106 | 137 | 91 | 78 | 84 | 75 | 30 | 27 | 24 | 26 | 57 | 51 | 49 | 48 | 44 | 40 | 27 | 34 |
| November | 218 | 224 | 270 | 205 | 179 | 168 | 169 | 167 | 148 | 122 | 134 | 102 | 48 | 36 | 39 | 30 | 100 | 96 | 81 | 64 | 77 | 65 | 63 | 43 |
| December | 265 | 315 | 267 | 381 | 198 | 210 | 198 | 241 | 197 | 175 | 171 | 151 | 46 | 42 | 47 | 42 | 114 | 135 | 97 | 98 | 76 | 110 | 78 | 79 |
| Annual Average | 204 | 199 | 228 | 227 | 190 | 200 | 156 | 174 | 137 | 124 | 116 | 116 | 54 | 43 | 43 | 44 | 112 | 99 | 91 | 76 | 78 | 67 | 56 | 62 |

Parameter: particulate matter smaller than 10 micrometer (PM₁₀).

National Ambient Air Quality Standards: 20 microgram per cubic meter.

Legend : Good= <60, Moderate= 61-120, Unhealthy= 121-350, Very unhealthy = 351-425 and Hazardous= >425

Source: Ministry of Environment, Science and Technology (NAAQS Monitoring Result in Kathmandu Valley (2003-2004), www. most.gov.np).

Table 4.5 : Average Sunshine Duration by Station*(hr/day)*

| S. N. | District/Station Name | Latitude | Longitude | Elevation (masl) | Year | | | | | | | | |
|-------|----------------------------------|----------|-----------|------------------|------|------|------|------|------|------|------|------|------|
| | | | | | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 1 | Banke, Nepalganj | 28° 06' | 81° 40' | 165 | 6.93 | NA | NA | NA | NA | NA | NA | NA | 7.4 |
| 2 | Bara, Simara Airport | 27° 10' | 84° 59' | 130 | 7.43 | 7.5 | 7.26 | 7.36 | 7.4 | 7.1 | 7.1 | 7.8 | 7.2 |
| 3 | Dadeldhura, Dadeldhura | 29° 18' | 80° 35' | 1848 | 7.39 | NA | 7.13 | 7.39 | 7.6 | 7.5 | 8 | 7.2 | NA |
| 4 | Dhankuta, Dhankura | 26° 59' | 87° 21' | 1210 | 6.81 | NA | 6.71 | 6.92 | 6.8 | 6.9 | NA | 6.8 | 6.7 |
| 5 | Doti, Dipayal | 29° 15' | 80° 57' | 617 | 6.51 | NA | 6.29 | 6.6 | 6.7 | 6.8 | NA | 6.7 | 6.7 |
| 6 | Jumla, Jumla | 29° 17' | 82° 14' | 2300 | 7.09 | 7.34 | 7.07 | NA | 6.7 | 6.9 | NA | 7.2 | NA |
| 7 | Kaski, Pokhara Airport | 28° 13' | 83° 48' | 827 | 6.92 | 6.83 | 6.3 | 6.51 | 6.3 | 6.6 | 6.4 | 6.5 | 6.6 |
| 8 | Kathmandu, Kathmandu Airport | 27° 42' | 85° 22' | 1336 | 5.04 | NA | 6.17 | 5.96 | 6.0 | NA | 5.6 | 6.0 | 6.1 |
| 9 | Morang, Biratnagar Airport | 26° 29' | 87° 16' | 72 | NA | 7.23 | 6.97 | 7.05 | 6.8 | 6.7 | NA | 7.4 | 6.8 |
| 10 | Okhaldhunga, Okhaldhunga | 27° 19' | 86° 30' | 1720 | NA | 6.27 | 6.11 | 6.3 | NA | 6.0 | NA | 5.8 | 6.1 |
| 11 | Rupandehi, Bhairahawa Airport | 27° 31' | 83° 26' | 109 | NA | 7.38 | NA | 7.0 | NA | NA | NA | 7.3 | 7.1 |
| 12 | Surkhet, Birendranagar | 28° 36' | 81° 37' | 720 | NA | 7.25 | NA | 7.34 | NA | NA | NA | NA | NA |
| 13 | Taplejung, Taplejung | 27° 21' | 87° 40' | 1732 | 5.04 | 6.17 | 5.82 | 6.15 | NA | NA | NA | NA | 6.1 |
| 14 | Kailali, Dhangadhi | 28° 41' | 80° 41' | 170 | 7.6 | 7.1 | 6.9 | 7.0 | 7.6 | 6.5 | NA | 7.0 | 7.1 |
| 15 | Lalitpur, Khumaltar | 27° 40' | 85° 20' | 1350 | NA | NA | NA | NA | 6.5 | 5.8 | 6.2 | 6.6 | 6.6 |

Source: Department of Hydrology and Meteorology.

Table 4.6 : Average Wind Speed by Station

(km/hr)

| S. N. | District/Station Name | Year | | | | | | | | | | |
|-------|-----------------------------------|------|------|------|------|------|------|------|-------|----------------|------|------|
| | | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 1 | Arghakhanchi, Khanchikot | 7.30 | 6.80 | 5.70 | NA | NA | NA | NA | 6.70 | 5.60 | 6.60 | NA |
| 2 | Bardia, Chishapani | NA | 7.60 | 7.90 | NA | NA | NA | NA | NA | NA | 7.20 | NA |
| 3 | Rupandehi, Bhairahawa Agriculture | NA | NA | NA | 2.76 | 2.76 | NA | 2.70 | 2.50 | 2.80 | 2.70 | 2.70 |
| 4 | Bhojpur, Bhojpur | NA | NA | 1.00 | 1.12 | 0.65 | 0.71 | 0.80 | 1.20 | Station closed | | |
| 5 | Dadeldhura, Dhaleldhura | 3.50 | 3.50 | 3.20 | 3.27 | 3.07 | 2.18 | 1.80 | 1.80 | 2.30 | 3.40 | 2.90 |
| 6 | Dhankuta, Pakhribas | NA | NA | NA | NA | NA | NA | 1.10 | 0.80 | 1.30 | 1.20 | 1.30 |
| 7 | Dhankuta, Dhankuta | NA | 4.70 | 3.80 | 3.92 | 4.18 | 4.11 | 4.10 | 3.80 | 3.90 | 3.90 | 3.50 |
| 8 | Dolakha, Jiri | 1.70 | 2.10 | NA | NA | NA | NA | NA | 2.50 | 2.90 | 3.20 | 3.10 |
| 9 | Doti, Dipayal | 1.60 | 1.50 | 1.40 | NA | NA | NA | 1.10 | 0.90 | 0.80 | 1.40 | 2.00 |
| 10 | Gorkha, Gorkha | 2.00 | NA | 1.60 | NA | NA | NA | NA | NA | NA | NA | NA |
| 11 | Ilam, Ilam Tea State | 2.90 | 1.40 | 1.50 | NA | NA | NA | NA | NA | NA | 1.20 | 1.20 |
| 12 | Jhapa, Kankai Gaida | 1.50 | 1.70 | 1.60 | 1.45 | 1.41 | 1.24 | 1.20 | 1.00 | NA | NA | NA |
| 13 | Mustang, Jomsom | NA | NA | NA | NA | NA | NA | NA | 15.60 | 16.10 | NA | NA |
| 14 | Jumla, Jumla | 5.50 | NA | 6.30 | NA | NA | NA | 5.80 | 5.20 | 6.00 | 5.40 | 5.60 |
| 15 | Kailai, Dhangadhi | 2.70 | 2.70 | 2.40 | NA | NA | NA | NA | NA | NA | NA | NA |
| 16 | Kanchanpur, Mahendranagar | 1.30 | 1.30 | 2.20 | 2.06 | 1.92 | 1.87 | 1.90 | NA | 1.80 | 2.40 | 2.10 |
| 17 | Kaski, Lumle | NA | 1.30 | 1.30 | 1.41 | 1.36 | 1.27 | 1.10 | 1.10 | 1.10 | 1.30 | 1.30 |
| 18 | Kathmandu, Kathmandu Airport | 1.40 | NA | 1.10 | 1.03 | 1.02 | 0.78 | 1.00 | 0.90 | 0.80 | 0.80 | |
| 19 | Lalitpur, Khumaltar | 2.10 | 2.20 | NA | 2.92 | 3.1 | 3.07 | 2.80 | 3.10 | 3.10 | 3.00 | 3.00 |
| 20 | Kaski, Malepatan | NA | NA | NA | 1.27 | 1.02 | 0.71 | 0.70 | 0.50 | 0.30 | 0.30 | 0.30 |
| 21 | Morang, Biratnagar Airport | NA | 1.80 | 1.30 | 1.2 | 1.51 | 1.08 | 2.20 | 2.80 | 2.00 | 1.80 | NA |
| 22 | Bhaktapur, Nagarkot | NA | NA | NA | NA | 6.24 | NA | NA | 5.00 | 4.40 | 4.30 | 3.70 |
| 23 | Banke, Nepalganj | NA | 3.60 | 2.90 | 2.6 | NA | 2.39 | 2.60 | 2.50 | 2.60 | 2.80 | 2.00 |
| 24 | Banke, Khajura | NA | NA | NA | NA | NA | NA | 1.60 | 1.70 | 1.90 | 2.20 | 1.90 |
| 25 | Banke, Sikta | NA | NA | NA | NA | NA | NA | 1.30 | 1.60 | 1.60 | 1.90 | 1.50 |
| 26 | Okhaldhunga, Okhaldhunga | 3.60 | 5.00 | 3.80 | 3.77 | 3.57 | 2.77 | 4.10 | 3.40 | 2.30 | 2.70 | 4.30 |
| 27 | Parsa, Parwanipur | 2.10 | 2.20 | NA | 1.95 | 2.31 | NA | 2.10 | 2.00 | 2.20 | 2.50 | 1.70 |
| 28 | Kaski, Pokhara Airport | 1.00 | 1.20 | 1.10 | 2.58 | 2.68 | 2.44 | 2.10 | 2.40 | 2.30 | 2.30 | NA |
| 29 | Siraha, Lahan | NA | NA | NA | NA | NA | NA | 3.10 | 3.50 | 3.30 | 3.90 | NA |
| 30 | Sunsari, Tarahara | 3.10 | 2.40 | 2.40 | NA | NA | NA | 3.90 | 4.50 | 4.00 | 4.50 | 7.00 |
| 31 | Surkhet, Biratnagar | 2.50 | 2.40 | 2.40 | 2.19 | 2.10 | 2.09 | 2.00 | 1.70 | 1.50 | 1.60 | 1.20 |
| 32 | Surkhet, Pusmacamp | 2.40 | NA | NA | 1.86 | 1.79 | NA | 2.10 | 1.90 | 1.70 | 1.60 | 1.90 |
| 33 | Tanahun, Khairanitar | 0.80 | 0.80 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 34 | Taplejung, Taplejung | 3.70 | NA | 1.80 | 1.78 | 2.46 | 3.06 | 3.00 | NA | 2.60 | 2.50 | NA |

NA- Not Available

Source: Department of Hydrology and Meteorology.

Table 4.7 : Noise Level at Different Areas

(dBA)

| Traffic Area | Day Hour | | | Night Hour | |
|---|----------------|---------------|------------------|----------------|------------------|
| | Nepal Observed | WHO Guideline | Indian Guideline | Nepal Observed | Indian Guideline |
| <u>High Traffic Area</u> | | 70 | | | |
| Kalanki, Kathmandu | 74 | | | 70 | |
| Shahidgate, Kathmandu | 67 | | | 69 | |
| Putalisadak, Kathmandu | 75 | | | 69 | |
| Maitighar, Kathmandu | 71 | | | 70 | |
| TU Gate, Kirtipur, Kathmandu | 58 | | | 58 | |
| Lagankhel, Lalitpur | 70 | | | 70 | |
| Satdobato, Lalitpur | 70 | | | 71 | |
| Kupandol, Lalitpur | 77 | | | 75 | |
| Suryabinayak, Bhaktapur | 71 | | | 81 | |
| Thimi Bus Stop, Bhaktapur | 65 | | | 53 | |
| Ramananda Chowk, Janakpur | 68 | | | 62 | |
| <u>Commercial Cum Residence Area</u> | | | 64 | | 55 |
| Asan Chowk, Kathmandu | 74 | | | 67 | |
| Naya Bazar, Kirtipu, Kathmandu | 64 | | | 62 | |
| Manbhawan, Lalitpur | 71 | | | 67 | |
| Bhanu Chowk, Janakpur | 70 | | | 67 | |
| <u>Commercial Cum Tourist Area</u> | | | 65 | | 55 |
| Thamel Chowk, Kathmandu | 75 | | | 61 | |
| Darbar Squar, Bhaktapur | 59 | | | 50 | |
| Mangal Bazar, Lalitpur | 69 | | | 59 | |
| Janaki Mandir, Janakpur | 73 | | | 70 | |
| <u>Old Residence Area</u> | | | | | 45 |
| Lagan, Kathmandu | 68 | | | 67 | |
| Panga, Kirtipur, Kathmandu | 60 | | | 57 | |
| Bhatkepati, Kirtipur, Kathmandu | 52 | | | 60 | |
| Pimbhal, Lalitpur | 57 | | | 51 | |
| Katunje, Bhaktapur | 52 | | | 65 | |
| Bhairab Mandir, Bhaktapur | 67 | | | 51 | |
| Maharaj Sagar, Janakpur | 58 | | | 61 | |
| <u>New Residence Area</u> | | | 55 | | 45 |
| Samakhushi, Kathmandu | 55 | | | 60 | |
| Sano Thimi, Bhaktapur | 62 | | | 62 | |
| Sanitar, Bhaktapur | 60 | | | 53 | |
| Sainbu, Lalitpur | 45 | | | 42 | |
| Khumaltar, Lalitpur | 53 | | | 54 | |
| <u>Industrial Area</u> | | 70 | 75 | | 70 |
| Balaju Training Institute, BID | 62 | | | 55 | |
| Balaju Yantra Shala, BID | 78 | | | 70 | |
| Chirag Foam Ind. Pvt. Ltd., BID | 63 | | | 54 | |
| Balaju Industrial Gate, BID | 74 | | | 68 | |
| Supreme Textile, PID | 61 | | | 58 | |
| Himal Tents Pvt. Ltd., PID | 61 | | | 56 | |
| Patan Industrial Gate, PID | 70 | | | 70 | |

Source: Nepal Health Research Council and World Health Organization (Assessment of Noise Pollution and Development of Criteria for its Prevention and Control, June 2003).

Table 4.8 : Annual Radiation Exposure at Some Location in Nepal, 1987-1998

(mrem/hr)

| Location | No of Points | Measured Equivalent Dose Rate 1987-1998 | | | Faction in % of the tolerance level | |
|-------------|--------------|--|------------------|------------------|--|------------------|
| | | \bar{x}_{1987} | \bar{x}_{1998} | \bar{x}_{\max} | \bar{x} | \bar{x}_{\max} |
| Kathmandu | 39 | 146 | 180 | 228 | 36 | 46 |
| Dakshinkali | 10 | 163 | 206 | 262 | 41 | 52 |
| Kakani | 5 | 165 | 262 | 350 | 52 | 70 |
| Thankot | 5 | 160 | 195 | 228 | 39 | 46 |
| Phulchoki | 4 | 163 | 203 | 228 | 40 | 46 |
| Sankhu | 6 | 153 | 193 | 228 | 38 | 46 |
| Dharan | 5 | 104 | 163 | 201 | 32 | 40 |
| Dhankuta | 6 | 148 | 181 | 228 | 36 | 46 |
| Biratnagar | 5 | 145 | 178 | 201 | 35 | 40 |

Source: Nepal Academy of Science and Technology, 1999, Third National Conference on Science & Technology, Proceedings Vol-1.

Table 4.9 : Industrial Noise Level

| Industrial Area | Activity | Noise level (Leq -dBA) |
|------------------------------------|-------------|------------------------|
| Balaju Aluminum Industry, BID | Spinning | 90-98 |
| Reliable Plastics, BID | Molding | 99-112 |
| Plastic Industries, BID | Molding | 97 |
| Nebico Biscuit, BID | Grinding | 100-104 |
| Balaju Yantra Shala Industry, BID | Cutting | 104 |
| Bottlers Nepal, BID | Filling | 96 |
| Nepal Feed Industry, BID | Grinning | 90-95 |
| Him Plastics, BID | Cutting | 100-103 |
| Eastern Textile Pvt. Ltd., Birganj | Loom | 102 |
| Birganj Sugar Mills, Birganj | Turbine | 105 |
| Hulas Steel Ind. Pvt. Ltd., Bara | Galvanizing | 94 |

Source: Occupational Safety and Health Project, Government of Nepal, 2000/01-2001/02. (Assessment of Noise Pollution and Development of Criteria for its Prevention and Control) Nepal Health Research Council and World Health Organization, June 2003).

Table 4.10 : PM₁₀, TSP, SO₂, NO₂, Co and pb Measurements

(average time 8 hrs.)

| Site | Altitude (masl) | Date | Time | Parameters | | | | | |
|---------------|--------------------|------------|-------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| | | | | PM ₁₀ | TSP | SO ₂ | NO ₂ | Co | pb |
| | | | | ($\mu\text{g}/\text{m}^3$) | ($\mu\text{g}/\text{m}^3$) | ($\mu\text{g}/\text{m}^3$) | ($\mu\text{g}/\text{m}^3$) | ($\mu\text{g}/\text{m}^3$) | ($\mu\text{g}/\text{m}^3$) |
| Pokhara | 827 | 26/11/2000 | 10:00-18:00 | 90.20 | 118.50 | 74.00 | 9.10 | NA | 0.11 |
| Birganj | 091 | 30/11/2000 | 10:00-18:00 | 482.90 | 567.80 | 63.00 | 23.00 | 378.00 | 0.27 |
| Biratnagar | 125 | 04/12/2000 | 08:00-16:00 | 961.40 | 1024.30 | 68.70 | 24.50 | 1145.48 | 0.24 |
| Janakpur | 090 | 07/11/2000 | 11:00-19:00 | 1820.90 | 2019.50 | 39.80 | 20.70 | 859.11 | 0.53 |
| Narayanghat | 256 | 10/12/2000 | 08:00-16:00 | 196.30 | 260.30 | 39.86 | 14.80 | NA | 0.04 |
| Butawal | 205 | 19/12/2000 | 07:00-15:00 | 1076.60 | 1150.20 | 140.50 | 21.38 | 229.09 | 0.09 |
| Bhairahawa | 110 | 22/12/2000 | 07:00-15:00 | 864.80 | 926.41 | 104.60 | 23.28 | 1145.48 | 0.13 |
| Nepalganj | 144 | 26/12/2000 | 07:00-15:00 | 2104.80 | 2222.50 | 68.66 | 17.78 | 1445.48 | 0.23 |
| Mahendranagar | 176 | 29/12/2000 | 08:00-16:00 | 355.05 | 378.54 | 85.01 | 17.14 | NA | 0.04 |

Note : Data were collected using high volume air sampler.

Source: Nepal Health Research Council and Nepal Environmental and Scientific Services (P) Ltd., (Transport Sector Air Pollution Survey, at Nine Major Urban Cities of Nepal, the World Conservation Union, Sept, 2001).

Table 4.11 : Laser Dust Monitor and Mini-pump Measurements for PM_{7.07} and Elemental Carbon, Kathmandu

| Sampling Site | Time | Temperature (°C) | Weather | Wind Direction | Traffic Volume /hr. | SPM (µg/m ³) | Element Carbon |
|---------------------------|-------|------------------|---------|----------------|---------------------|--------------------------|----------------|
| Putalisadak | 12:15 | 24 | Fine | S | 353 | 257.6 | 6 |
| City Bus Park | 12:30 | 26 | Fine | E | 408 | 186.6 | 10 |
| New Road Gate | 12:50 | 28 | Fine | N | 574 | 95.7 | 4 |
| Thamel | 1:05 | 29 | Fine | NE | 152 | 68.7 | 2 |
| Maharajganj | 1:25 | 26 | Fine | E | 343 | 136.3 | 6 |
| New Bus Park | 1:55 | 26 | Fine | E | 243 | 109.3 | 5 |
| Balaju | 2:12 | 27 | Fine | E | 289 | 214.8 | 4 |
| Swayambhu | 2:45 | 29 | Fine | N | 0 | 77.8 | 1 |
| Balkhu | 3:22 | 25 | Fine | NE | 142 | 137 | 8 |
| Satdobato | 3:40 | 25 | Fine | SE | 253 | 193.1 | 9 |
| Koteshwor | 4:06 | 25 | Fine | E | 333 | 116.2 | 3 |
| Airport | 4:30 | 25 | Fine | E | 186 | 78.9 | 3 |
| Chabahil | 4:50 | 24 | Fine | E | 444 | 179.7 | 2 |
| Tribhuvan Chok, Nepalganj | 2:18 | 30 | Fine | Calm | 221 | 176.1 | 2 |
| Mahendra Chok, Biratnagar | 3:40 | 30 | Fine | E | 196 | 189.3 | 5 |

S= South, E= East, N=North, SE = South -East, NE= North -East.

Source: Nepal Health Research Council and Nepal Environmental & Scientific Services (P) Ltd., Sept, 2001.

Final Report on World Health Organization, Result Number 8, Amod Pokhrel and Anil Raut, 1999/2000.

Table 4.12 : Ozone Depleting Substance (ODS) Consumption in Nepal, 1998

| Use Sector | Substance | ODS Consumption (tones/yr) |
|---|-----------|----------------------------|
| Commercial Refrigeration | | |
| New Equipment Servicing | CFC-12 | 0.90 |
| Shops and other commercial establishments | CFC-12 | 1.44 |
| Dairy | CFC-12 | 3.01 |
| Beverage manufacturing enterprises | CFC-12 | 0.15 |
| Building Air Conditioning | | |
| Servicing Central Units | CFC-12 | 7.69 |
| Domestic Refrigeration | | |
| New Equipment | CFC-12 | 15.82 |
| Servicing | CFC-12 | 29.00 |

Source: Nepal Academy of Science and Technology (Third National Conference on Science & Technology, Proceedings Vol-1, 1999.)

Table 4.13 : Day-Night Noise Level (L_{dn}) Value at Different Environmental Setting, 2003

| Environmental Setting | Typical Range of L_{dn} , dBA | Average L_{dn} , dBA |
|---------------------------------|---------------------------------|------------------------|
| High Traffic Area | 64-86 | 74.36 |
| Old Residential Area | 59-73 | 66.28 |
| New Residential Area | 48-69 | 62.00 |
| Commercial Cum Residential Area | 69-75 | 72.75 |
| Commercial Cum Tourist Area | 59-76 | 69.25 |

Source: Nepal Health Research Council, 2003.

Table 4.14 : Physiographic and Bioclimatic Zones of Nepal

| Physiographic Area | Percent of Surface Area | Elevation (m) | Bioclimatic Zone | Average Annual Temperature (°C) |
|--------------------|-------------------------|--|--|---------------------------------|
| High Himalaya | 23 | Above - 5000 | Tundra or arctic | <10 |
| High Mountain | 20 | 4000 - 5000 3000 - 4000 | Alpine Sub alpine | 10-15 |
| Middle Mountain | 30 | 2000- 3000 | Cool temperature | |
| Low land Terai | 27 | 1000 - 2000 0500 -1000 Below 500 | Warm monsoon Hot monsoon Tropical /hot monsoon | 15-20 > 20 |
| Total | 100 | | | |

Source: Ministry of Environment, Science and Technology (Land Resource Mapping Project, 1986, Dobremez, 1975 and Nepal Biodiversity Resource Book, 2001).

Table 4.15 : National Ambient Air Quality Standards for Nepal, 2003

| Parameters | Units | Averaging Time | WHO Guideline | Concentration in Ambient Air, maximum | Test Method |
|------------------------------------|--------------------------|------------------------|---------------|---------------------------------------|---|
| TSP (Total Suspended Particulates) | $\mu\text{g}/\text{m}^3$ | Annual 24-hours* | 120-230 | - 230 | HVS 24 hour sampling(one weak sample on 2 road side station) |
| PM ₁₀ | $\mu\text{g}/\text{m}^3$ | Annual 24-hours* | 70 | - 120 | Light Volume Sampling |
| Sulphur Dioxide | $\mu\text{g}/\text{m}^3$ | Annual 24-hours** | 125 | 50 70 | Diffusive sampling based on weekly average |
| Nitrogen Dioxide | $\mu\text{g}/\text{m}^3$ | Annual 24-hours** | 150 | 40 80 | Diffusive sampling based on weekly average |
| Carbon Monoxide | $\mu\text{g}/\text{m}^3$ | 8 hours** 15 minute | 100000 | 10,000 100,000 | To be determined before 2005 Indicative sampler |
| Lead | $\mu\text{g}/\text{m}^3$ | Annual 24-hours | 0.5-1.0* | 0.5 - | Atomic absorption spectrometry analysis of PM ₁₀ samples |
| Benzene | $\mu\text{g}/\text{m}^3$ | Annual 24-hours | - | 20**** - | Diffusive sampling based on weekly average |

Note: *24 hourly values shall be met 95% of the time in a year. 18 days per calendar year the standard may be exceeded but not on two consecutive days, **24 hourly standards for NO₂ and SO₂ and 8 hours standard for CO are not to be controlled before MOPE has recommended appropriate test methodologies. This will be done before 2005, ***If representativeness can be proven, yearly averages can be calculated from PM₁₀ samples from selected weekdays from each month of the year, ****To be re-evaluated by 2005.

Source: Nepal Gazette B.S. 2060/4/19 (4 August, 2003)

Table 4.16 : Average Rainfall and Temperature by Altitude

| Average Annual Rainfall (mm) | Temperature Zone: Altitude (in masl) | | | |
|------------------------------|---|--|--|---|
| | Less than 1000 | 1000-1500 | 1500-2000 | 2000-3000 |
| Less than 500 | | | | Jomsom, Mustang |
| 500-1000 | | | | Jumla |
| 1000-2000 | Mahendranagar, Kanchanpur Nepalgunj Banke Dhangadi, Kailali Bhairahawa, Rupandehi Janakpur, Dhanusha Dipayal, Doti Simara, Bara Biratnagar, Morang | Salyan Nuwakot Dhankuta Patan, Baitadi Gorkha Ilam Silgadhi, Doti Dailekh | Okhaldhunga Pakhribas Tamghas Bhojpur Dadeldhura | Chailsa Daman, Makawanpur |
| 2000-3000 | Butawal, Rupandehi Khairanitar, Tanahu Hetauda, Makawanpur Syangja, Syangja | Taplethok | Chatara Kannyam | Musikot Kakani, Nuwakot Jiri, Dolakha |
| Greater than 3000 | Pokhara, Kaski Khudibazar, Lamjung | Panchsaya Khola | Lumle, Kaski | Lete |

Source: Department of Hydrology and Meteorology, 1994.

Table 4.17 : Total Emission in Different Sectors*

| Year | Sector | TSP | CO | HC | N ₂ O | SO ₂ |
|------|-------------|--------|--------|--------|------------------|-----------------|
| 1985 | R/C | 182595 | 635321 | 96542 | 9569 | 29975 |
| | Industry | 3913 | 6027 | 6740 | 758 | 1026 |
| | Transport | 335 | 3717 | 2127 | 1437 | 149 |
| | Agriculture | 11 | 3 | 7 | 2 | 65 |
| 1990 | R/C | 204381 | 730359 | 108903 | 10907 | 35630 |
| | Industry | 5612 | 7834 | 5536 | 1346 | 2713 |
| | Transport | 809 | 9004 | 4981 | 3587 | 349 |
| | Agriculture | 6 | 13 | 4 | 51 | 256 |
| 1995 | R/C | 235406 | 853782 | 125857 | 12780 | 42064 |
| | Industry | 9426 | 12908 | 8068 | 2360 | 4901 |
| | Transport | 1677 | 18585 | 10635 | 7186 | 744 |
| | Agriculture | 4 | 8 | 3 | 30 | 76 |
| 1996 | R/C | 246528 | 744500 | 121850 | 12972 | 25870 |
| | Industry | 13947 | 18890 | 10756 | 3643 | 7781 |
| | Transport | 1839 | 21436 | 12427 | 7696 | 808 |
| | Agriculture | 3 | 7 | 2 | 27 | 67 |

Note : R/C = Residential and Commercial, *Estimation of Pollutants Based on Energy Consumption.

Source : Water and Energy Commission Secretariat, 1997.

Table 4.18 : Emission of TSP and PM₁₀

| Sources | TSP (tons/yr) | | | PM ₁₀ (tons/yr) | |
|----------------------------|----------------|---------------|--------------|----------------------------|---------------|
| | 1993 | 2001 | 2005 | 1993 | 2001 |
| Mobile sources | | | | | |
| Vehicle exhausts | 570 | 1971 | NA | 570 | 3,259 |
| Road dust re-suspension | 1,530 | 7008 | 12,239 | 400 | 1,822 |
| Sub-total | 2,100 | 8979 | 12,239 | 970 | 5,081 |
| Stationary sources | | | | | |
| Industrial/commercial fuel | 582 | NA | NA | 292 | NA |
| Domestic fuel combustion | 2328 | NA | 630 | 1,166 | NA |
| Brick kilns | 5,180 | 6,676 | 1,850 | 1,295 | 1,688 |
| Himal cement | 6,000 | 3,612 | 0 | 800 | 455 |
| Stone crushers | NA | NA | 1,720 | NA | 372 |
| Industrial boilers | NA | 28 | 28 | NA | 15 |
| Fugitive emissions | | | | | |
| Refuse burning | 385 | 687 | 172 | 190 | 339 |
| Agricultural sector | NA | NA | NA | 2,337 | |
| Cremation | NA | NA | 158 | NA | 79 |
| Total | 19,982* | 16,797 | 4,712 | 7,580 | 12,649 |

Source: Ministry of Environment, Science and Technology, 2005.

Table 4.19 : Estimated Total Emission and Air Pollutants from Different Sectors, 1985-1996

(tones)

| Sector | Pollutant | Year | | |
|----------------------|------------------|--------|--------|--------|
| | | 1985 | 1990 | 1996 |
| Residence & Business | T.S.P | 182595 | 204381 | 246528 |
| | Carbon monoxide | 635321 | 730359 | 744500 |
| | Hydrogen | 96542 | 108903 | 121850 |
| | Nitrogen dioxide | 9569 | 10907 | 12972 |
| | Sulfur dioxide | 29975 | 35630 | 25870 |
| Industry | T.S.P | 3913 | 5612 | 13947 |
| | Carbon monoxide | 6027 | 7834 | 18890 |
| | Hydrogen | 6740 | 5538 | 10756 |
| | Nitrogen dioxide | 758 | 1346 | 3643 |
| | Sulfur dioxide | 1026 | 2713 | 7781 |
| Transportation | T.S.P | 335 | 809 | 1839 |
| | Carbon monoxide | 3717 | 9004 | 21438 |
| | Hydrogen | 2127 | 4981 | 12427 |
| | Nitrogen dioxide | 1437 | 3587 | 7696 |
| | Sulfur dioxide | 149 | 349 | 808 |
| Agriculture | T.S.P | 11 | 6 | 3 |
| | Carbon monoxide | 3 | 13 | 7 |
| | Hydrogen | 7 | 4 | 2 |
| | Nitrogen dioxide | 2 | 51 | 27 |
| | Suffer dioxide | 65 | 256 | 67 |

Source : United Nations Environment Program (UNEP)/MOPE/ICIMOD, 2001.

Table 4.20 : Estimated Emissions from Domestic Sectors, 1999-2000

| Energy Used | Energy Used ('000 ton) | Pollutants (tones/ year) | | | | |
|---------------------|------------------------|--------------------------|--------|--------|-----------------|-----------------|
| | | TSP | CO | HCS | NO _x | SO _x |
| Fuel Wood | 5912 | 227385 | 606359 | 106113 | 10611 | 9095 |
| Agriculture Residue | 265 | 9138 | 68534 | 6853 | 640 | 5483 |
| Dung | 448 | 17920 | 98600 | 13440 | 1254 | 10752 |
| LPG | 20 | 2 | 421 | 4 | 92 | 0 |
| Kerosene | 195 | 632 | 6861 | 36 | 450 | 767 |

TSP = 0.12 mg/m³

Source: Ministry of Population and Environment, 2001.

Table 4.21 : Pollutants Emission from Total Energy Used

| Energy Used | Energy Used ('000 ton) | Pollutants (tones/ year) | | | | |
|---------------------|------------------------|--------------------------|--------|--------|-----------------|-----------------|
| | | TSP | CO | HCS | NO _x | SO _x |
| Fuel Wood | 6023 | 247097 | 772200 | 115830 | 108113 | 92664 |
| Agriculture Residue | 272 | 9379 | 47475 | 4748 | 475 | 3798 |
| Animal Waste | 448 | 17920 | 89600 | 13440 | 1254 | 10752 |
| Coal | 205 | 12724 | 15905 | 3534 | 2616 | 6362 |
| Petroleum | 709 | 164 | 16300 | 109 | 2180 | 2180 |

Source: Ministry of Population and Environment, 2001.

Table 4.22 : Emissions Standards for 'In-Use' Vehicles

| Fuel | Wheeler Type | Manufacturing Date | Emissions |
|---------|----------------|--------------------|---|
| Petrol | Four-Wheelers | Upto 1980 | <ul style="list-style-type: none"> 4.5% CO 1,000 ppm HC |
| | Four-Wheelers | After 1981 | <ul style="list-style-type: none"> 3.0% CO 1,000 ppm HC |
| | Three-Wheelers | Upto 1991 | <ul style="list-style-type: none"> 4.5% CO 7,800 ppm HC |
| | Three-Wheelers | After 1991 | <ul style="list-style-type: none"> 3.0% Co 7,800 ppm HC |
| | Two-Wheelers | | <ul style="list-style-type: none"> 4.5% CO 7,800 ppm HC |
| Diesel | - | Upto 1994 | <ul style="list-style-type: none"> 75 HSU |
| | | After 1994 | <ul style="list-style-type: none"> 65 HSU |
| LPG/CNG | All categories | | <ul style="list-style-type: none"> 3.0% CO 1,000 ppm HC |

Source: Ministry of Works and Transport (Nepal Gazette, BS 2054-9-8).

Table 4.23 : WHO Guideline Value on Noise Level*(Sound level In dBA)*

| Description | Level of Hearing |
|----------------------|--------------------------------|
| Threshold of hearing | 0-10 |
| Very peace sound | 20-30 |
| Peace sound | 50-60 |
| Medium sound | 70-80 |
| Very high sound | 90-100 |
| Uncomfortable sound | 120-130 (Threshold of feeling) |

Source: World Health Organization cited in Batu Krishna Uprety, *Environment Protection & Sustainable Development*, 2001.

Table 4.24 : WHO Guideline Value on Air Quality

| Compound | Guideline Value | Averaging Time |
|----------------------|--|-----------------------|
| Ozone (1) | 120 micrograms/cubic metre (0.06 ppm) | 8 hours |
| Nitrogen dioxide (1) | 200 micrograms/cubic metre (0.11 ppm) | 1 hour |
| | 40 to 50 micrograms/cubic metre (0.021 to 0.026 ppm) | 1 hour |
| Sulfur dioxide (1) | 500 micrograms/cubic metre (0.175 ppm) | 10 min |
| | 125 micrograms/cubic metre (0.044 ppm) | 24 hours |
| | 50 micrograms per cubic metre (0.017 ppm) | 1 hour |
| Carbon monoxide (2) | 100 milligrams/cubic metre (90 ppm) ^b | 15 min |
| | 60 mg/cubic metre (50ppm) | 30 min |
| | 30 mg/cubic metre (25 ppm) | 1 hour |
| | 10 mg/cubic metre (10 ppm) | 8 hours |
| Lead (3) | 0.5 to 1.0 micrograms/cubic metre | 1 hour |

(1) No guideline values were set for particulate matter because there is no evident threshold for effects on morbidity and mortality.

(2) The guideline is to prevent carboxyhemoglobin levels in the blood from exceeding 2.5%. The values above are mathematical estimates of some of the CO concentrations and averaging times at which this goal should be achieved.

(3) The guideline for lead was established by WHO in 1987.

Source: World Health Organization (*Ambient Air Quality Guideline*).

Table 4.25 : Ranges of Emission Reductions Required for Various Stabilization Level

(The ranges of the difference between emission in 1990 and emission allowances in 2030/2050 for various GHG concentration levels Annex I and non-Annex I countries as a group^a)

| SCENARIO CATEGORY (lowest level of GHG assessed by IPCC 2007) | UNIT | REGION | 2020 | 2050 |
|--|---------------------------------------|--------------|--|--|
| A- 450 | ppmv CO ₂ -eq ^b | Annex I | -25% to -40% | -80% to -95% |
| | | Non- Annex I | Substantial deviation from baseline in Latin America, Middle East, East Asia and Centrally- planned Asia | Substantial deviation from base line in all regions |
| B-550 | ppmv CO ₂ -eq | Annex I | -10% to -30% | -40% to -90% |
| | | Non- Annex I | Deviation from baseline in Latin America, Middle East, East Asia. | Deviation from baseline in most regions, specially Latin America, Middle East. |
| C-650 | ppmv CO ₂ -eq | Annex I | -0% to -25% | -30% to -80% |
| | | Non- Annex I | Baseline | Deviation from baseline in most regions, specially Latin America, Middle East. |

a) The aggregate range is based on multiple approaches to apportion emission between regions (concentration and convergence, multi-stage, triptych and intensity targets among others). Each approach makes different assumptions about the pathway, specific national efforts and other variables. Additional extreme cases- in which Annex I undertakes all reductions, or non-Annex I undertakes all reductions- are not included. The range presented here does not imply political feasibility, nor do not result reflect cost variances.

b) Only the studies aiming at stabilization at 450 ppmv CO₂, -eq assume a (temporary) overshoot of about 50 ppmv CO₂, -eq (see Den Elzen and Meinshausen, 2006)

Note : Annex I and II = Industrialized countries and that pay for cost in developing countries (The Bali Road Map page 205). Non-Annex - I except Annex I and II.

Source : IPCC Working Group III (WG III) Chapter 13 Box 13.7.

Chapter V

Land / Soil

Table 5.1 : Land Use Pattern

(area in Ha.)

| Types of Land Use / Utilization | 1986* | | 2001** | |
|---------------------------------|-----------------|------------|-----------------|------------|
| | Area | Percent | Area | Percent |
| Cultivated land | 2968017 | 19.98 | 3090780 | 21 |
| Non-Cultivated land | 986898 | 6.64 | 1030390 | 7 |
| Forest | 5618052 | 37.82 | 4268200 | 29 |
| Shrub | 688408 | 4.63 | 1560110 | 10.6 |
| Grass/pasture land | 1757345 | 11.83 | 1766160 | 12 |
| Other | 2836322 | 19.09 | 2619800 | 17.8 |
| Snow area | 506317 | | | |
| Barren land | 13414 | | | |
| Rock | 1966076 | | | |
| Stone/Sand / (Eroded) | 328003 | | | |
| Water/Lake | 11584 | 0.08 | 382660 | 2.6 |
| Urban area | 10914 | 0.07 | | |
| Total | 14855042 | 100 | 14718100 | 100 |

Source: * Department of Forest Research and Survey (Land Resource Mapping Project, Land Utilization Report- 1986.);

** Department of Forest Research and Survey, 2001..

**Table 5.2 : Land Use Pattern and Spatial Extent by Development Region
Ecological Zone and Residence**

| Area | Approximate Elevation (in masl) | Area (sq km) | Area (%) | Forest Area (sq. km) | Shrub Area (sq. km) | Forest and Shrub Area (%) | Pop ⁿ . Density |
|-------------------------------|---------------------------------------|-----------------|-------------|----------------------------|---------------------------|---------------------------------|-------------------------------|
| Development Region | | | | | | | |
| Eastern | | 28450 | 19.33 | 7361 | 3626 | 38.62 | 188 |
| Central | | 27405 | 18.62 | 9186 | 2538 | 42.78 | 293 |
| Western | | 29407 | 19.98 | 7424 | 2669 | 34.32 | 155 |
| Mid Western | | 42373 | 28.79 | 11924 | 3942 | 37.44 | 71 |
| Far Western | | 19546 | 13.28 | 6874 | 2739 | 49.18 | 112 |
| Ecological Zone | | | | | | | |
| Mountains | Above than 4870 | 51817 | 35.21 | 2281 | 1678 | 7.64 | 33 |
| Hills | 600 - 4870 | 61345 | 41.68 | 26544 | 13722 | 65.64 | 167 |
| Tarai | Below than 600 | 34019 | 23.11 | 13945 | 114 | 41.33 | 330 |
| Residence | | | | | | | |
| Rural | | 143905 | 97.8 | | | | 135.97 |
| Urban (Municipality) | | 3276 | 2.2 | | | | 985.23 |
| Total | | 147181 | 100 | 42682 | 15514 | 39.60 | 157 |

Source: Central Bureau of Statistics (Population Census- 2001) and Department of Forest Research and Survey, 1999.

Table 5.3 : Land Utilization*(area in Ha.)*

| Land Use | 1961/62 | 1971/72 | 1981/82 | 1991/92 | 2001/02 |
|-------------------------------|----------------|----------------|----------------|----------------|----------------|
| Total Area of holding | 1685 | 1654 | 2464 | 2597 | 2654 |
| Agriculture land | 1626 | 1592 | 2359 | 2393 | 2498 |
| Arable land | 1592 | 1567 | 2288 | 2324 | 2357 |
| Land under temporary crops | 1551 | 1537 | 2250 | 2285 | 2326 |
| Other arable land | 41 | 30 | 37 | 40 | 31 |
| Land under permanent crops | 12 | 15 | 29 | 29 | 118 |
| Land under permanent pastures | 22 | 10 | 43 | 37 | 20 |
| Ponds | NA | NA | NA | 4 | 4 |
| Non-agriculture land | 59 | 62 | 105 | 205 | 156 |
| Wood land and forest | 14 | 5 | 15 | 109 | 37 |
| Other land | 45 | 57 | 90 | 96 | 119 |

Source : Central Bureau of Statistics (National Sample Census of Agriculture, Nepal).

Table 5.4 : Land Use Pattern by District

(area in Ha.)

| Dist. Code | District | Total Forest Area | Shrub | Agricultural land/ grass | Water bodies | Barren land | Snow | Others | Total |
|------------|---------------|-------------------|-------|--------------------------|--------------|-------------|--------|--------|--------|
| 1 | Taplejung | 112256 | 56362 | 70946 | 405 | 37757 | 60115 | 27496 | 365337 |
| 2 | Panchthar | 53182 | 14369 | 54078 | 181 | 326 | 29 | 0 | 122165 |
| 3 | Ilam | 72214 | 31649 | 64595 | 236 | 2873 | 0 | 0 | 171567 |
| 4 | Jhapa | 13239 | 1863 | 141795 | 778 | 6517 | 0 | 0 | 164192 |
| 5 | Morang | 43814 | 6040 | 126955 | 1374 | 4996 | 0 | 0 | 183179 |
| 6 | Sunsari | 21304 | 1508 | 91799 | 6262 | 6861 | 0 | 0 | 127734 |
| 7 | Dhankuta | 26324 | 14598 | 47350 | 549 | 982 | 0 | 0 | 89803 |
| 8 | Terhathum | 20033 | 12489 | 34917 | 129 | 494 | 0 | | 68062 |
| 9 | Sankhuwasabha | 159872 | 48476 | 71335 | 975 | 23723 | 40825 | 0 | 345206 |
| 10 | Bhojpur | 61448 | 22207 | 66525 | 552 | 1284 | 0 | 0 | 152016 |
| 11 | Solukhumbu | 86002 | 49628 | 67424 | 571 | 59670 | 50037 | 19509 | 332841 |
| 12 | Okhaldhunga | 32363 | 15592 | 58858 | 352 | 729 | 0 | 0 | 107894 |
| 13 | Khotang | 61039 | 22571 | 74328 | 931 | 2020 | 0 | 0 | 160889 |
| 14 | Udayapur | 109404 | 15766 | 70005 | 1150 | 6587 | 0 | 0 | 202912 |
| 15 | Saptari | 30286 | 82 | 94397 | 3154 | 8169 | 0 | 544 | 136632 |
| 16 | Siraha | 20202 | 679 | 94268 | 818 | 4201 | 0 | 0 | 120168 |
| 17 | Dhanusa | 25773 | 1832 | 83617 | 1300 | 5158 | 0 | 0 | 117680 |
| 18 | Mahottari | 24086 | 1602 | 70897 | 1224 | 4836 | 0 | 0 | 102645 |
| 19 | Sarlahi | 21786 | 918 | 100624 | 488 | 2834 | 0 | 0 | 126650 |
| 20 | Sindhuli | 136302 | 25708 | 71842 | 1268 | 8442 | 0 | 0 | 243562 |
| 21 | Ramechhap | 48477 | 33076 | 67900 | 620 | 6149 | 3906 | 0 | 160128 |
| 22 | Dolakha | 78111 | 41194 | 54778 | 401 | 16031 | 22913 | 2985 | 216413 |
| 23 | Sindhupalchok | 92955 | 36017 | 67105 | 162 | 17404 | 32560 | 2679 | 248882 |
| 24 | Kavre | 46448 | 29511 | 67492 | 434 | 750 | 0 | 0 | 144635 |
| 25 | Lalitpur | 14620 | 8250 | 15553 | 125 | 999 | 0 | 0 | 39547 |
| 26 | Bhaktapur | 583 | 611 | 5440 | 1 | 316 | 0 | 0 | 6951 |
| 27 | Kathmandu | 12680 | 5219 | 22677 | 69 | 2375 | 0 | 0 | 43020 |
| 28 | Nuwakot | 42916 | 23526 | 48412 | 405 | 2405 | 1352 | 0 | 119016 |
| 29 | Rasuwa | 47494 | 15667 | 9443 | 54 | 8983 | 25138 | 44308 | 151087 |
| 30 | Dhading | 79205 | 31945 | 66322 | 745 | 4464 | 6382 | 0 | 189063 |
| 31 | Makwanpur | 137220 | 22578 | 75529 | 817 | 5696 | 0 | 0 | 241840 |
| 32 | Rautahat | 29076 | 563 | 78805 | 715 | 3332 | 0 | 0 | 112491 |
| 33 | Bara | 37974 | 1394 | 78480 | 298 | 1997 | 0 | 0 | 120143 |
| 34 | Parsa | 73131 | 922 | 63342 | 181 | 2513 | 0 | 0 | 140089 |
| 35 | Chitawan | 132746 | 6230 | 77280 | 2465 | 3696 | 0 | 0 | 222417 |
| 36 | Gorkha | 101158 | 52885 | 62886 | 497 | 23616 | 119141 | 0 | 360183 |
| 37 | Lamjung | 87552 | 22328 | 30999 | 607 | 9116 | 15162 | 0 | 165764 |
| 38 | Tanahu | 71949 | 18881 | 60850 | 1004 | 1410 | 49 | 0 | 154143 |
| 39 | Syangja | 51214 | 16685 | 45515 | 707 | 1293 | 74 | 0 | 115488 |
| 40 | Kaski | 89087 | 24881 | 28361 | 1803 | 10417 | 47308 | 0 | 201857 |
| 41 | Manang | 11760 | 20304 | 279 | 378 | 29828 | 165154 | 0 | 227703 |

Table 5.4 : Land Use Pattern by District (contd...)

(area in Ha.)

| Dist. Code | District | Total Forest Area | Shrub | Agricul-tural land/ grass | Water bodies | Barren land | Snow | Others | Total |
|------------|--------------|-------------------|----------------|---------------------------|--------------|----------------|----------------|---------------|-----------------|
| 42 | Mustang | 16723 | 23587 | 285 | 272 | 78241 | 229295 | 10856 | 359259 |
| 43 | Myagdi | 67898 | 51574 | 16744 | 330 | 23035 | 70444 | 0 | 230025 |
| 44 | Parbat | 26189 | 7756 | 15371 | 141 | 735 | 7 | 0 | 50199 |
| 45 | Baglung | 91505 | 39702 | 21453 | 391 | 24612 | 1738 | 0 | 179401 |
| 46 | Gulmi | 51649 | 26853 | 36524 | 364 | 3033 | 80 | 0 | 118503 |
| 47 | Palpa | 72607 | 23736 | 44332 | 538 | 70 | 42 | | 141325 |
| 48 | Nawalparasi | 89635 | 15210 | 104672 | 3260 | 9260 | 25 | 0 | 222062 |
| 49 | Rupandehi | 19897 | 3989 | 99894 | 1807 | 9063 | 0 | 0 | 134650 |
| 50 | Kapilbastu | 60500 | 2232 | 104141 | 2632 | 3951 | 0 | 0 | 173456 |
| 51 | Arghakhanchi | 69961 | 19414 | 24292 | 302 | 865 | 0 | 0 | 114834 |
| 52 | Pyuthan | 93042 | 3919 | 24587 | 526 | 8547 | 0 | 0 | 130621 |
| 53 | Rolpa | 150095 | 486 | 16458 | 67 | 19027 | 0 | 0 | 186133 |
| 54 | Rukum | 174725 | 2130 | 12961 | 130 | 77148 | 23253 | 0 | 290347 |
| 55 | Salyan | 143786 | 2610 | 36419 | 526 | 7337 | 0 | 0 | 190678 |
| 56 | Dang | 170124 | 8233 | 106934 | 1727 | 10343 | 0 | 0 | 297361 |
| 57 | Banke | 104269 | 9461 | 71475 | 1923 | 6296 | 0 | 0 | 193424 |
| 58 | Bardiya | 99364 | 5300 | 85809 | 2548 | 4756 | 0 | 0 | 197777 |
| 59 | Surkhet | 157687 | 33269 | 48653 | 1899 | 7556 | 0 | 0 | 249064 |
| 60 | Dilekh | 88699 | 20705 | 36341 | 167 | 8812 | 353 | 0 | 155077 |
| 61 | Jajarkot | 151306 | 1088 | 24126 | 489 | 43401 | 4095 | 0 | 224505 |
| 62 | Dolpa | 60603 | 3910 | 77 | 764 | 474881 | 249817 | 0 | 790052 |
| 63 | Jumla | 110531 | 1118 | 19819 | 338 | 98595 | 18566 | 0 | 248967 |
| 64 | Kalikot | 87165 | 3846 | 15560 | 0 | 48264 | 9588 | 0 | 164423 |
| 65 | Mugu | 87312 | 9387 | 20729 | 1360 | 139358 | 69568 | 0 | 327714 |
| 66 | Humla | 41051 | 21954 | 12584 | 677 | 112174 | 421759 | 0 | 610199 |
| 67 | Bajura | 72507 | 23982 | 31414 | 264 | 32110 | 63897 | 0 | 224174 |
| 68 | Bajhang | 92391 | 39713 | 43697 | 440 | 38826 | 139599 | 0 | 354666 |
| 69 | Achham | 99144 | 16967 | 45102 | 422 | 6219 | 154 | 0 | 168008 |
| 70 | Doti | 141848 | 17277 | 44839 | 311 | 2049 | 10 | 0 | 206334 |
| 71 | Kailali | 169708 | 14761 | 129769 | 2330 | 4715 | 0 | 0 | 321283 |
| 72 | Kanchanpur | 84420 | 2207 | 71938 | 1361 | 5680 | 0 | 0 | 165606 |
| 73 | Dadeldhura | 105937 | 11280 | 31359 | 212 | 1306 | 0 | 0 | 150094 |
| 74 | Baitadi | 72020 | 27751 | 46368 | 370 | 1229 | 0 | 0 | 147738 |
| 75 | Darchaula | 58177 | 31218 | 32902 | 591 | 30750 | 81568 | 0 | 235206 |
| | Total | 5599760 | 1283231 | 4061631 | 64664 | 1683493 | 1974003 | 108377 | 14775159 |

Source: Department of Forest (Information System Development Project for the Management of Tropical Forest; Activity Report of Wide Area and Tropical Forest Resource Survey, March, 2001).

Table 5.5 : Change in Forest Covered Area in Tarai Districts (Excluding Protected Areas)*(area in Ha)*

| District | Forest cover 1990/91 | Forest cover 2000/01 | Change | Change in % |
|--------------|----------------------|----------------------|--------------|--------------|
| Kanchanpur | 54546 | 51933 | -2613 | -4.79 |
| Kailali | 210413 | 205939 | -4474 | -2.13 |
| Bardiya | 35491 | 33719 | -1772 | -4.99 |
| Banke | 113074 | 110820 | -2254 | -1.99 |
| Dang | 191200 | 194262 | 3062 | 1.60 |
| Kapilbastu | 64579 | 62211 | -2368 | -3.67 |
| Rupandehi | 27305 | 26524 | -781 | -2.86 |
| Nawalparasi | 91026 | 93171 | 2145 | 2.36 |
| Chitawan | 61677 | 63586 | 1909 | 3.10 |
| Parsa | 18904 | 18644 | -260 | -1.38 |
| Bara | 49632 | 49157 | -475 | -0.96 |
| Rautahat | 29472 | 29559 | 87 | 0.30 |
| Sarlahi | 30037 | 30528 | 491 | 1.63 |
| Mahottari | 23587 | 24181 | 594 | 2.52 |
| Dhanusa | 28876 | 28323 | -553 | -1.92 |
| Siraha | 19021 | 18278 | -743 | -3.91 |
| Saptari | 21054 | 21110 | 56 | 0.27 |
| Sunsari | 21659 | 21365 | -294 | -1.36 |
| Morang | 45718 | 45184 | -534 | -1.17 |
| Jhapa | 21274 | 21000 | -274 | -1.29 |
| Total | 1158545 | 1149494 | -9051 | -0.78 |

Source : Department of Forest, 2005, (Forest Covered Change Analysis of the Tarai Districts 1990/91-2000/01).

Table 5.6 : Wetland Area by Type

| Wet Land Types | Estimated Area (Ha) | % of Total |
|----------------|---------------------|------------|
| River | 395000 | 53.27 |
| Lakes | 5000 | 0.67 |
| Reservoirs | 1380 | 0.19 |
| Village Pounds | 5183 | 0.70 |
| Paddy Fields | 325000 | 43.83 |
| Marshland | 10000 | 1.35 |
| Total | 741563 | 100 |

Source : Ministry of Forests and Soil Conservation, 2003.

Table 5.7 : Nepal's Ramsar Sites

| S. N. | Name | Location | Area (Ha) | Altitude (masl) | Ramsar declaration date |
|-------|------------------------------|------------|-----------|-----------------|-------------------------|
| 1 | Beeshazar Taal | Chitwan | 3200 | 286 | 13.08.2003 |
| 2 | Ghodaghodi Lake Area | Kailali | 2563 | 205 | 13.08.2003 |
| 3 | Gokyo Lake Complex | Solukhumbu | 7770 | 4734 | 23.09.2007 |
| 4 | Gosaikunda Lake Complex | Rasuwa | 1030 | 4380 | 23.09.2007 |
| 5 | Jagadishpur Reservoir | Kapilvastu | 225 | 197 | 13.18.2003 |
| 6 | Koshi Tappu Wildlife Reserve | Sunsari | 17500 | 90 | 17.12.1987 |
| 7 | Shey Phoksundo | Dolpa | 494 | 3612 | 23.09.2007 |
| 8 | Rara Lake | Mugu | 1583 | 2990 | 23.09.2007 |
| 9 | Mai Pokhari | Ilam | 12 | 2100 | 27.11.2008 |

Source: Banko Janakari, Special Issue, Feb, 2009.

Table 5.8 : Sediment Yield in Large Watersheds

| Watersheds | Watersheds Area (sq. km) | Sediment Delivery (ton/Ha/yr) |
|------------|--------------------------|-------------------------------|
| Tamor | 5770 | 38.0 (1) |
| | 5700 | 70.0 (6) |
| | 5900 | 80.0 (4) |
| | 5770 | 38.0 (5) |
| Sunkoshi | 18985 | 21.0 (1) |
| | 19000 | 65.0 (3) |
| | 19000 | 45.0 (4) |
| Bagmati | 585 | 45.0 (6) |
| Trisuli | 4100 | 18.0 (6) |
| | 4110 | 18.5 (3) |
| Karnali | 42890 | 21.0 (9) |
| Nagmati | 1388 | 46.0 (3) |
| Ganges | 1076000 | 13.5 (8) |
| Saptakosi | 59280 | 15.0 (1) |
| | 62000 | 27.7 (8) |
| | 6100 | 31.0 (7) |
| | 59280 | 15.0 (5) |
| Arun | 34525 | 7.6 (1) |
| | 36000 | 16.0 (7) |
| | 36533 | (4) |
| | 34525 | 7.6 (5) |

Reference : Impat-1979; Sherchan-1991; Schaffner-1987; Upadhaya-et.al. 1991; Ries- 1994; Maskey and Joshy- 1991; Karver-1995; Erl – 1988; HPC-1989.

Source : Water and Energy Commission Secretariat/ CIDA.(Himalayan Sediment, Issue and Guidelines, 2003).

Table 5.9 : Sediment Yield in Small Watersheds

| Watersheds | Watersheds Area (sq. km) | Sediment Delivery (ton/Ha/yr) |
|----------------------------|--------------------------|-------------------------------|
| Lahore River | 63 | 6.8 (1) |
| Bamti Khola | 8 | 13.3 (2) |
| Chhukarpo Khola (up) | 23.5 | 29.8 (2) |
| Chhukarpo Khola (down) | 369 | 3.7 (2) |
| Surma Khola | 570 | 2.1 (2) |
| Harpan Khola (Phewa Tal) | 12000 | 8.9 (9) |
| Kukhuri khola | 75 | 17.0 (11) |
| Anderi Khola | 540 | 15.0 (11) |
| Jhinkhu | 11141 | 11.0 (11) |
| Sunsdarizal | 1553 | 12.9 (3) |
| Godavari | 1231 | 3.3 (3) |
| Bishnumati | 614 | 10.7 (3) |
| Mahabharat 1 Check dams | 19 | 29.0 (4) |
| Kulekhani (re - 1993) | 12500 | 20.45 (10) |

Reference : Impat-1979; Sherchan-1991; Schaffner-1987; Upadhaya-et.al. 1991; Laban-1978; Mulder- 1978; Carson- 1985.

Source : Water and Energy Commission Secretariat/CIDA (Himalayan Sediment, Issue and Guidelines 2003).

Table 5.10 : Soil Test by Particulate Matter (PM₁₀) in Soils of Kathmandu Valley

| Location | Height (m) | PM ₁₀ (mg/m ³) |
|--------------|------------|---------------------------------------|
| Thimi | 12 | 190.50 |
| Bhaktapur | 12 | 170.81 |
| Battisputali | 3 | 169.79 |
| Kalimati | 12 | 161.33 |
| Balaju | 3 | 181.60 |

Source: Nepal Health Research Council and Nepal Environmental & Scientific Service (P) Ltd, Sept. 2001.

Table 5.11 : Affected Land Area from Erosion

| Degradation Type | Affected Area (million ha) | Affected Area as % of Contry's Total Land Area |
|------------------------|---------------------------------|---|
| Water erosion | 6.7 | 45.4 |
| Wind erosion | 0.6 | 4.0 |
| Chemical deterioration | 0.3 | 1.7 |
| Physical deterioration | 0.2 | 1.3 |

Sources: Ministry of Environment, Science and Technology, 2008.

Table 5.12 : Estimated Soil Erosion Rate at Selected Sites in Nepal

| Area | Location and Characteristics | Level Use | Erosion Rate (ton /sq. km/yr.) |
|-----------------|---|---|-----------------------------------|
| Siwalik Range | Eastern Nepal, South Aspect, Sand Stone Foot Hills | Forest to Grazing | 780 - 3680 |
| | Far Western Nepal, South Aspect of Surkhet | a. Degraded land | 2000 |
| | | b. Gully land | 4000 |
| Middle Mountain | Central Nepal, Mahabharata Lake, Steep Slope, Metamorphic and Sedimentary rocks | c. Degraded, heavily grazed gully land | 20000 |
| | | a. Degraded forest and agriculture land | 3150 - 14000 |
| | Northern Foothills of Katmandu Valley | b. Dully land | 6300 - 42000 |
| | | a. Degraded forest & shrub land | 2700 - 4500 |
| | | b. Over grazed shrub land | 4300 |
| | | c. Severe gully land | 12500 - 57000 |
| | South of Katmandu Valley | dense forest | 800 |
| | Phewa Watershed | a. Protected pasture | 920 |
| | | b. Overgrazed grass land | 2200 - 34700 |
| | | c. Gully overgrazed grass land | 2900 |

Source: Water and Energy Commission Secretariat, and Central Bureau of Statistics 1998.

Table 5.13 : Soil Erosion in Tistung by Treatment and Year

| Year | Soil Loss (ton/Ha) | | | | |
|----------------|---|---|---|---|---|
| | Farmers' practice without hedgerows (I) | Farmers' practice with hedgerows of most preferred species (II) | As treatment II but without nutrient inputs (III) | Farmers' practice with hedgerows of most preferred species (IV) | Farmers' practice with hedgerows and inclusion of fruit trees, vegetables and cash crops for higher economic gain (V) |
| 1996 | 0.468 | 0.247 | 0.535 | 0.183 | 0.269 |
| 1997 | 0.414 | 0.272 | 0.406 | 0.294 | 0.219 |
| 1998 | 0.208 | 0.101 | 0.135 | 0.1 | 0.127 |
| 1999 | 0.543 | 0.223 | 0.304 | 0.178 | 0.084 |
| 2000 | 0.174 | 0.104 | 0.13 | 0.141 | 0.068 |
| Average | 0.361 | 0.189 | 0.302 | 0.179 | 0.154 |

Source: Department of Soil Conservation and Watershed Management (Soil Erosion Studies in Nepal: Results and Implications- 2003).

Table 5.14 : Characteristics of the Soil (0-15cm) in Ranighat Gulmi by Experimental site (2005/06)

| Attributes | Unit | Observation | Attributes | Unit | Observation |
|---------------|------|-------------|--------------------------|-------|-------------|
| Soil pH | | 5.82 | Sand | % | 34.5 |
| OM N | % | 1.37 | Silt | % | 49.0 |
| Total N, | % | 0.0547 | Clay | % | 16.5 |
| P | µg/g | 10.4 | Moisture retention at FC | % | 8.95 |
| K | µg/g | 15.4 | Moisture retention at WP | % | 6.04 |
| bulk density, | g/cc | 1.5945 | Hydraulic Conductivity | cm/hr | 0.0234 |

OM = Organic Matter

Source, Nepal Agriculture Research Council, Annual Report, 2005/06.

Table 5.15 : Soil Erosion Reported by Holdings

(area in Ha.)

| Holding type | Total Area of Soil Erosion Reported by Holdings | Percent of Soil Erosion Area |
|-----------------------|---|------------------------------|
| Holdings with land | 30805 | 1.16 |
| Holdings without land | 40 | 33.93 |
| Total | 30845 | 1.16 |

Source: Central Bureau of Statistics (National Sample Census of Agriculture, Nepal 2001/02).

Table 5.16 : Distribution of Type and Color of Soil Reported by Holdings

(area in ha.)

| Soil/Color Type | Total Area of Soil Type Reported by Holdings | Area Percent Reported by Holdings |
|---------------------------------|--|-----------------------------------|
| Soil type | | |
| Sand (Balaute) | 589455 | 41.06 |
| Silt (Pango) | 167822 | 11.69 |
| Clay (Chimtyilo) | 532488 | 37.09 |
| Clay Loam (Domat and Chimtyolo) | 145777 | 10.15 |
| Total | 1435542 | 100 |
| Soil Color type | | |
| Black | 825307 | 35.57 |
| Brown | 939299 | 40.48 |
| Yellow | 215460 | 9.29 |
| Red | 283687 | 12.23 |
| Other | 56485 | 2.43 |
| Total | 2320239 | 100 |

Source: Central Bureau of Statistics (National Sample Census of Agriculture, Nepal, 2001/02).

Table 5.17 : Annual Deforestation by Ecological Belt

| Physiographic Zone | Unit | Annual Rate of Deforestation in 20 Tarai Districts | Annual Rate of Forest Area Decreased |
|--------------------|------|--|--------------------------------------|
| Mountain and Hills | % | | 2.3 |
| Tarai | % | 0.06 | 1.3 |
| Nepal | % | | 1.7 |

Source : Department of Forest (Forest Cover Change Analysis of the Tarai District 1990/91-2000/01)

Table 5.18 : Livestock and Poultry Population in Arid and Semi-Arid Land

(Livestock and poultry per arid land sq. km)

| Year | Category | | | | | | |
|---------|----------|-----------|-------|-------|------|-------|-------|
| | Cattle | Buffaloes | Sheep | Goats | Pigs | Fowls | Ducks |
| 1981/82 | 89 | 33 | 9 | 50 | 6 | NA | NA |
| 1991/92 | 101 | 43 | 8 | 76 | 7 | 186 | 5 |
| 1996/97 | 97 | 46 | 12 | 81 | 10 | 214 | 6 |
| 1997/98 | 97 | 47 | 12 | 84 | 11 | 229 | 6 |
| 1998/99 | 97 | 48 | 12 | 85 | 11 | 245 | 6 |
| 1999/00 | 97 | 48 | 12 | 87 | 12 | 256 | 6 |
| 2000/01 | 96 | 50 | 12 | 89 | 13 | 272 | 6 |
| 2001/02 | 96 | 51 | 12 | 91 | 13 | 294 | 6 |
| 2002/03 | 96 | 53 | 11 | 93 | 13 | 306 | 6 |
| 2003/04 | 96 | 56 | 11 | 98 | 13 | 313 | 5 |
| 2004/05 | 119 | 69 | 14 | 122 | 16 | 387 | 7 |
| 2005/06 | 119 | 71 | 14 | 126 | 16 | 395 | 7 |
| 2006/07 | 120 | 74 | 14 | 133 | 17 | 407 | 7 |
| 2007/08 | 121 | 76 | 14 | 138 | 17 | 419 | 7 |

* Arid land = cultivated, non cultivated and grassland estimated area 58813.3 sq. km.

Source: Ministry of Agriculture and Cooperatives.

Table 5.19 : Livestock and Poultry Population by Type in Arid and Semi-Arid Land

| Kind of Livestock | Livestock Population (' 000) | | | Change in % | |
|--|------------------------------|--------------|--------------|--------------|--------------|
| | 1981/82 | 1991/92 | 2001/02 | 1991/92 | 2001/02 |
| Livestock Total | 13721 | 17154 | 18831 | 27.52 | 10.75 |
| Cattle | 6502 | 7359 | 7215 | 14.50 | -2.15 |
| Chary/ yak | 56 | 59 | 95 | 5.89 | 67.12 |
| Buffaloes | 2380 | 3116 | 3478 | 34.02 | 12.78 |
| Goat | 3644 | 5516 | 6933 | 56.51 | 28.26 |
| Sheep | 677 | 603 | 471 | -12.02 | -24.08 |
| Pigs | 434 | 496 | 633 | 15.71 | 30.38 |
| Horses | NA | 14 | 20 | | 47.14 |
| Mules and Asses | 28 | 5 | 6 | -90.36 | 22.00 |
| Others | NA | 7 | 16 | | 141.43 |
| Poultry Total | 8342 | 14042 | 19926 | 75.16 | 46.09 |
| Chicken | 7369 | 12333 | 17631 | 74.10 | 47.25 |
| Ducks | 142 | 280 | 393 | 106.90 | 44.39 |
| Pigeons | 831 | 1420 | 1845 | 77.97 | 32.92 |
| Others | NA | 9 | 57 | | 586.67 |
| Livestock in Population per Arid and Semi-arid Land | 0.23 | 0.29 | 0.32 | | |
| Poultry Population per Arid and Semi-arid Land | 0.14 | 0.24 | 0.34 | | |

Arid land = cultivated, non cultivated and grass land 58813.3 Sq. km

Source: Central Bureau of Statistics (National Sample Censuses of Agriculture, Nepal).

Table 5.20 : Additional Irrigation Facilities by Topography and Type

(area in Ha.)

| Description | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08** |
|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|
| 1. Topography | | | | | | | | |
| a) Hill | 7266 | 6296 | 4251 | 1303 | 195 | 1620 | 2878 | 1050.0 |
| b) Terai | 22395 | 11291 | 7572 | 11450 | 11128.5 | 16782 | 23931.5 | 2776 |
| c) Not classified | - | - | - | - | 2 | - | 158 | - |
| Total | 29661 | 17587 | 11823 | 12753 | 11326 | 18402 | 26968 | 3826 |
| 2. Type | | | | | | | | |
| a) Canals | 26091 | 14882 | 7308.2 | 6846.5 | 2560 | 7764 | 5460 | 1550 |
| b) Ground Water | 3570 | 2705 | 4506 | 5905 | 8763.5 | 10638 | 21024 | 2220 |
| c) Not Classified | - | - | 8.8 | 1.5 | 2 | - | 483.5 | 56 |
| Total | 29661 | 17587 | 11823 | 12753 | 11326 | 18402 | 26968 | 3826 |

** First Eight Months

Source: Department of Irrigation and Agriculture Development Bank.

Table 5.21 : Irrigated Land by Source and Ecological Belt*(area Irrigated in '000 Ha)*

| Source of Irrigation | Ecological Belt (1991/92) | | | | Ecological Belt (2001/02) | | | |
|-----------------------|---------------------------|--------|--------|--------|---------------------------|-------|--------|--------|
| | Mountain | Hill | Tarai | Nepal | Mountain | Hill | Tarai | Nepal |
| Tube well/bore | 0.1 | 0.9 | 98.8 | 99.8 | 0.3 | 2.4 | 212.2 | 214.9 |
| Canal (permanent) | 13.7 | 84.1 | 148 | 245.8 | 20.8 | 118.3 | 207.6 | 346.7 |
| Canal (Seasonal) | 24.5 | 144 | 268.2 | 436.7 | 39.2 | 172.3 | 309.7 | 521.2 |
| Pond/tank | 0.5 | 1.8 | 23.2 | 25.4 | 0.6 | 2.8 | 20.4 | 23.8 |
| Others | 3 | 14.8 | 56.9 | 74.7 | 1.1 | 9 | 78.4 | 88.5 |
| Area Irrigated | 41.8 | 245.5 | 595.1 | 882.4 | 62.1 | 204.9 | 801.3 | 1068.3 |
| Total Area of holding | 176.8 | 1046.2 | 1374.3 | 2597.4 | 218.7 | 801.3 | 1396.6 | 2416.6 |

Source: Central Bureau of Statistics (National Sample Censuses of Agriculture, Nepal).

Table 5.22 : Area Under Permanent Crops

| Permanent Crops* | Area of Compact Plantation ('000' Ha.) | | Change in % |
|-------------------------|--|---------|---------------|
| | 1991/92 | 2001/02 | 1991- 2001/02 |
| Holding with Fruit Tree | 29.387 | 33.237 | 13.1 |
| Orange | 2.39 | 3.2 | 33.89 |
| Lemon | 0.446 | 0.623 | 39.69 |
| Lime | 0.182 | 0.292 | 60.44 |
| Sweet orange | 0.049 | 0.228 | 365.31 |
| Junar (sweet orange) | NA | 0.513 | - |
| Other Citrus | 0.37 | 0.339 | -8.38 |
| Mango | 15.203 | 18.479 | 21.55 |
| Banana | 2.126 | 3.14 | 47.7 |
| Guava | 0.358 | 0.484 | 35.2 |
| Jackfruit | 0.587 | 0.676 | 15.16 |
| Pineapple | 0.249 | 0.229 | -8.03 |
| Lychee | 0.277 | 0.779 | 181.23 |
| Pear | 0.114 | 0.346 | 203.51 |
| Apple | 0.605 | 1.38 | 128.1 |
| Plum | 0.113 | 0.447 | 295.58 |
| Papaya | 0.11 | 0.301 | 173.64 |
| Pomegranate | 0.077 | 0.087 | 12.99 |
| Other fruit Trees | 2.662 | 1.696 | -36.29 |
| Other Permanent Crops | 87.467 | 11.66 | 78.332 |
| Tea | 3.467 | 6.197 | 78.74 |
| Thatch* | 66.385 | 67.643 | 1.9 |
| Fodder Tree | 2.455 | 7.281 | 196.58 |
| Bamboo* | 60.24 | 6.346 | -89.47 |

* Not compact plantation.

Source : Central Bureau of Statistics (National Sample Censuses of Agriculture, Nepal, 2001/02).

Table 5.23 : Area Under Selected Temporary Crops

| Selected Crops | Crop Area ('000 Ha) | | |
|----------------|---------------------|---------|---------|
| | 1981/82 | 1991/92 | 2001/02 |
| Paddy | 1394 | 3252 | 3423 |
| Wheat | 389 | 633 | 794 |
| Maize | 523 | 769 | 769 |
| Millet | 154 | 302 | 251 |
| Barley | 28 | 46 | 39 |
| Buckwheat | 11 | 16 | 21 |
| Other Cereals | NA | 5 | 5 |
| Legumes | 335 | 340 | 379 |
| Tubers | 86 | 79 | 93 |
| Cash Crops | 86 | 63 | 61 |
| Oilseeds | 224 | 260 | 214 |
| Spices | 58 | 29 | 41 |
| Vegetables | 17 | 40 | 60 |

Source: Central Bureau of Statistics (National Sample Censuses of Agriculture, Nepal)

Table 5.24 : List of Banned Pesticides in Nepal

| Name of Pesticides* | Name of Pesticides* | Name of Pesticides* |
|---------------------|---------------------|--------------------------|
| Chlordane | Mirex | Aldrin |
| DDT | Toxaphene | Endrin |
| Dieldrin | BHC | Heptachlor |
| Lindane | Phosphamidon | Organo Mercury Compounds |

* Persistent of Organic Pollutant (POP's) Pesticides.

Source: Nepal Gazette, 2001/02.

Chapter VI

Water and Sanitation

Table 6.1 : Supply of Drinking Water by Agency

| Year | Unit | Water Supply | | | | | Leakage of Water (%) | No. of Treatment Plants of NWSC |
|---------|---------|--------------|-----------------|--------|---------|--------|------------------------|---------------------------------|
| | | DWSS | | NWSC | KUKL | Total | | |
| | | Total | Urban Area Only | | | | | |
| 1993/94 | Th. L/d | 46948 | 1736 | 16000 | | 64684 | 38 | 4 |
| 1994/95 | Th. L/d | 54471 | 4608 | 3300 | | 62379 | | |
| 1995/96 | Th. L/d | 54067 | 3880 | 5500 | | 63447 | | |
| 1996/97 | Th. L/d | 34650 | | 5500 | | 40150 | | |
| 1997/98 | Th. L/d | 31815 | | 300 | | 32115 | | |
| 1998/99 | Th. L/d | 20011 | | 7000 | | 27011 | | |
| 1999/00 | Th. L/d | 28271 | | 3000 | | 31271 | | |
| 2000/01 | Th. L/d | 25164 | | 1480 | | 26644 | 37 | 4 |
| 2001/02 | Th. L/d | 2876 | | 7000 | | 9876 | 37 | 4 |
| 2002/03 | Th. L/d | 5552 | | 5000 | | 10552 | 37 | 5 |
| 2003/04 | Th. L/d | 8550 | | 3000 | | 11550 | 36 | 5 |
| 2004/05 | Th. L/d | 5580 | | 4000 | | 9580 | 37 | 7 |
| 2005/06 | Th. L/d | 7200 | 1000 | 18100 | | 26300 | 38 | 7 |
| 2006/07 | Th. L/d | 22500 | 8000 | 3000 | | 33500 | 37 | 28 |
| 2007/08 | Th. L/d | 4950 | 12400 | 111200 | 101900* | 230450 | 35 ⁺ | 34 |

* Water supply in dry season, + KUKL

Source: Department of Water Supply and Sewerage (DWSS), Nepal Water Supply Corporation (NWSC) and Kathmandu Upatyaka Khanepani Ltd. (KUKL).

Table 6.2 : Mineral Contaminants of Drinking Water, 2003/04

| Parameters | Mineral water | | | Drinking water | | |
|--|---|-----|-------|----------------|-----|------|
| | Max | Min | Mean | Max | Min | Mean |
| pH | 8.3 | 5.5 | 6.9 | 8.1 | 6.2 | 7.2 |
| Total dissolved solid (mg/l) | 346 | 4 | 175 | 630 | 5 | 317 |
| Hardness (mg/l) | 182 | 0.1 | 91.05 | 175 | 0.1 | 88 |
| Alkalinity (mg/l) | 140 | 1 | 70.5 | 136 | 1 | 68 |
| Ammonia (mg/l) | ND | ND | | ND | ND | |
| Chloride (mg/l) | 92 | 0.2 | 46.1 | 78 | 0.5 | 39 |
| Iron (mg/l) | 0.3 | 0.1 | 0.2 | 0.5 | 0.1 | 0.3 |
| Sulphate (mg/l) | Trace | ND | | Trace | ND | |
| Calcium (mg/l) | 67 | ND | | 56 | 0.1 | 28 |
| Magnesium (mg/l) | 84 | ND | | 84 | ND | |
| Zinc (mg/l) | ND | | | ND | | |
| Lead (mg/l) | ND | | | ND | | |
| Cadmium (mg/l) | ND | | | ND | | |
| Chromium (mg/l) | ND | | | ND | | |
| Pesticide Residue (mg/l) | DDT,BHC, Parathion, Methyl parathion and Malathion are not detected | | | | | |
| Micro-organism Total Mesospheric Count/ml Coliform/100ml | 5-44 x 10 ² 7->2400 in 8 samples | | | | | |

ND : Not defined.

Source : Department of Food Technology and Quality Control -2003/04.

Table 6.3 : Ground Water Quality of Aquifers (Shallow Tube) in the Terai Region, 2003

| Site (District) | Chloride (mg/l) | Ammonia (mg/l) | Nitrate (mg/l) | Iron (mg/l) | Manganese (mg/l) | Coli form (cfu/100 ml) |
|--------------------------|--------------------|-------------------|-------------------|----------------|---------------------|---------------------------|
| Panchgachhi (Jhapa) | 15.4 | 0.7 | 0.2 | 6.0 | 0.8 | 1.1 |
| Baijanathpur (Morang) | 16.6 | 0.5 | 0.2 | 4.5 | 0.5 | 15.9 |
| Bayarban (Morang) | 17.6 | 0.5 | 2.4 | 6.0 | 0.6 | 0.5 |
| Takuwa (Morang) | 21.0 | 1.0 | 1.0 | 10.4 | 0.4 | 45.9 |
| Shreepur Jabdi (Sunsari) | 37.2 | 0.9 | 0.2 | 8.0 | 0.6 | 25.5 |
| Bandipur (Sunsari) | 195.6 | 0.7 | 3.5 | 0.4 | 0.4 | 1.0 |
| Naktiraipur (Saptari) | 45.6 | 1.2 | 0.3 | 12.0 | 1.3 | 16.0 |
| WHO Guideline | 250.0 | 1.24 | 10.0 | 3.0 | 0.5 | nil |

Source: Environment and Public Health Organization 1999 and United Nations Environment Program, 2000.

Table 6.4 : Distribution of Households by Various Sources of Drinking Water by Region, 2001

| Area | Percentage Distribution of Source of Drinking Water | | | | | | | Total Households |
|---------------------------|---|------|------------|-------------|----------------|--------|---------------|------------------|
| | Piped Water | Well | Tube -well | Spout Water | Rivers/ Stream | Others | Total Percent | |
| Nepal | 53.4 | 9.1 | 28.6 | 6.5 | 1.5 | 0.9 | 100.0 | 4,174,457 |
| <i>Place of Residence</i> | | | | | | | | |
| Urban | 66.1 | 5.9 | 23.3 | 3.3 | 0.5 | 0.9 | 100.0 | 664,507 |
| Rural | 51.1 | 9.7 | 29.6 | 7.0 | 1.7 | 0.9 | 100.0 | 3,509,950 |
| <i>Ecological Belt</i> | | | | | | | | |
| Mountain | 72.7 | 6.3 | 0.0 | 17.2 | 3.5 | 0.4 | 100.0 | 285,217 |
| Hill | 72.7 | 12.1 | 2.5 | 10.2 | 2.0 | 0.5 | 100.0 | 1,950,345 |
| Terai | 31.1 | 6.6 | 59.3 | 1.1 | 0.6 | 1.4 | 100.0 | 1,938,895 |
| <i>Development Region</i> | | | | | | | | |
| Eastern | 35.6 | 9.3 | 48.7 | 4.7 | 1.0 | 0.7 | 100.0 | 1,001,121 |
| Central | 58.3 | 8.6 | 28.4 | 3.3 | 0.6 | 0.7 | 100.0 | 1,465,753 |
| Western | 69.3 | 9.0 | 14.0 | 5.5 | 1.1 | 1.1 | 100.0 | 863,045 |
| Mid Western | 52.0 | 11.5 | 17.5 | 14.3 | 4.0 | 0.7 | 100.0 | 479,009 |
| Far Western | 47.0 | 7.9 | 23.4 | 16.0 | 3.6 | 2.1 | 100.0 | 365,529 |

Source: Central Bureau of Statistics (Population Census, 2001).

Table 6.5 : Distribution of Households by Toilet Facility by Region, 2001

| Area | Households Having Toilet Facility (%) | | | Type of Toilet Facility | | Total Households |
|--------------------|---------------------------------------|------|-------|-------------------------|----------|------------------|
| | Yes | No | Total | Modern with Flush | Ordinary | |
| Nepal | 46.8 | 53.2 | 100.0 | 23.0 | 23.8 | 4,174,457 |
| Place of Residence | | | | | | |
| Urban | 78.1 | 21.9 | 100.0 | 53.0 | 25.0 | 664,507 |
| Rural | 40.8 | 59.2 | 100.0 | 17.3 | 23.5 | 3,509,950 |
| Ecological Belt | | | | | | |
| Mountain | 40.8 | 59.2 | 100.0 | 7.9 | 32.9 | 285,214 |
| Hill | 56.5 | 43.5 | 100.0 | 27.2 | 29.2 | 1,951,192 |
| Terai | 37.9 | 62.1 | 100.0 | 21.0 | 16.9 | 1,938,051 |
| Development Region | | | | | | |
| Eastern | 46.1 | 53.9 | 100.0 | 15.7 | 30.4 | 1,000,441 |
| Central | 51.7 | 48.3 | 100.0 | 30.4 | 21.2 | 1,465,753 |
| Western | 55.1 | 44.9 | 100.0 | 27.0 | 28.1 | 863,045 |
| Mid Western | 31.9 | 68.1 | 100.0 | 16.2 | 15.7 | 479,817 |
| Far Western | 28.6 | 71.4 | 100.0 | 12.6 | 16.0 | 365,401 |

Source: Central Bureau of Statistics (Population Census, 2001).

Table 6.6 : Summary of Known Arsenic Occurrence in Tarai Districts

(As of July 2008)

| S. No. | District | Total Number of Tests | Samples with Arsenic Concentrations | | | Maximum Concentrations Detected |
|--------|-------------|-----------------------|-------------------------------------|------------|----------|---------------------------------|
| | | | 0-10 ppb | >10-50 ppb | > 50 ppb | |
| 1 | Jhapa | 97065 | 96296 | 715 | 54 | 79 |
| 2 | Morang | 112332 | 109865 | 2285 | 182 | 70 |
| 3 | Sunsari | 67085 | 64150 | 2519 | 416 | 75 |
| 4 | Saptari | 57094 | 53873 | 2630 | 591 | 98 |
| 5 | Siraha | 46625 | 39194 | 6112 | 1319 | 250 |
| 6 | Dhanusha | 60783 | 58026 | 2305 | 452 | 140 |
| 7 | Mahottari | 34007 | 33679 | 297 | 31 | 80 |
| 8 | Sarlahi | 50573 | 43235 | 6748 | 590 | 98 |
| 9 | Rautahat | 50506 | 39967 | 9393 | 1146 | 500 |
| 10 | Bara | 39837 | 35203 | 3147 | 1487 | 254 |
| 11 | Parsa | 28424 | 26071 | 1595 | 758 | 456 |
| 12 | Chitwan | 411 | 410 | 1 | 0 | 8 |
| 13 | Nawalparasi | 32219 | 23844 | 4418 | 3957 | 1200 |
| 14 | Rupandehi | 75396 | 72316 | 2567 | 513 | |
| 15 | Kapilbastu | 39915 | 36060 | 2662 | 1193 | 589 |
| 16 | Dang | 26949 | 26725 | 175 | 49 | 81 |
| 17 | Banke | 45191 | 43083 | 1840 | 268 | 270 |

Table 6.6 : Summary of Known Arsenic Occurrence in Tarai Districts (contd...)

(As of July 2008)

| | | | | | | |
|-----------------------------|------------|----------------|---------------|--------------|--------------|-----|
| 18 | Bardiya | 61501 | 55646 | 3150 | 2705 | 101 |
| 19 | Kailali | 84543 | 74460 | 7193 | 2890 | 450 |
| 20 | Kanchanpur | 53239 | 47330 | 4313 | 1596 | 450 |
| Total Samples Tested | | 1063695 | 979433 | 64065 | 20197 | |

Source: Department of Water Supply and Sewerage.

Table 6.7 : River Water Discharge Floating from Nepal

| River Basin | Catchments Area (sq. km, estimated) | | Average Discharge (m ³ /s) | Annual Discharge (billion m ³ /year) |
|------------------------|-------------------------------------|---------------|---------------------------------------|---|
| | Total (India and Nepal) | Nepal | | |
| Himalayan River | | | | |
| Koshi | 60400 | 27863 | 1409 | 45.00 |
| Gandaki | 34960 | 31464 | 1600 | 50.00 |
| Karnali | 43679 | 41058 | 1397 | 44.00 |
| Mahakali | 15260 | 5188 | 573 | 18.00 |
| Mahabharat Rivers | | 17000 | 461 | 14.50 |
| Siwalik Rivers | | 23150 | 1682 | 53.00 |
| Total | | 145723 | 7122 | 224.5 |

Source: Water and Energy Commission Secretariat, 2005.

Table 6.8 : Water Quality Condition of Selected Lakes

| Parameters | Unit | Phewa | Begnas | Rupa | Gosainkunda |
|-------------------|--------|--------|--------|--------|-------------|
| BOD | mg/l | 2.00 | 2.00 | 2.68 | NA |
| N-NO ₃ | mg/l | 0.12 | 0.10 | 0.10 | 0.20 |
| Total Nitrogen | mg/l | 260.00 | 233.60 | 176.40 | 210.00 |
| TP | mg/l | 45.00 | 43.50 | 59.60 | 6.80 |
| P-PO ₄ | mg/l | 30.00 | 18.70 | 23.30 | 3.00 |
| Chlorophyll | mg/l | 8.00 | 5.50 | 6.50 | 1.20 |
| E-coli | 100 ml | 8.00 | 28.90 | 393.30 | NA |

NA: Not Available.

Source: Environment and Public Health Organization (1995, 1998), COSMOS (2000).

Table 6.9 : Deep Aquifer Depletion in Selected Locations During Dry Season of Kathmandu Valley

| Location | Year | Water Level in 1976 AD (m) | | Water Level in 1999 AD (m) | | Decline (m) | |
|-----------|------|----------------------------|------|----------------------------|--------|-------------|-------|
| | | SWL | PWL | SWL | PWL | SWL | PWL |
| Bansbari | 1997 | 48.08 | 67.6 | 80.63 | 136.14 | 32.55 | 68.54 |
| Baluwatar | 1976 | F.W. | 21 | 22.41 | 30 | 22.41 | 9 |
| Pharping | 1976 | F.W. | 25 | 13 | 44 | 13 | 19 |

PWL= Pumping water level, SWL=Static water level, F.W.= Flowing well.

Source : Centre for Environment and Management (2000), Metcalf and Eddy (2000).

Table 6.10 : Glaciers and Catchment Areas having Meteorological and Hydrological Stations

(Latitude and Longitude in degree and minute)

| Name of Glacier | Catchment Areas (sq.km) | River Basin | Major Glacier | Meteorological Station | | | Hydrological Station | | |
|---|-------------------------|-----------------------------|-------------------|------------------------|----------------|-----------------|----------------------|----------------|-----------------|
| | | | | Latitude North | Longitude East | Altitude (masl) | Latitude North | Longitude East | Altitude (masl) |
| 1. Makalu, Tashigaon | 240 | Barun | Barun | 27° 37' | 87° 16' | 2100 | 27° 44' | 87° 11' | 2000 |
| 2. Khumbu a) Dingboche b) Pangboche | 135 | Imja Imja | Imja Imja | 27° 53' | 86° 49' | 4355 | 27° 53' | 86° 56' | 4355 |
| 3. Langtang, Kyangjing | 340 | Langtang | Langtang | 28° 13' | 85° 37' | 3920 | 28° 13' | 85° 33' | 3800 |
| 4. Annapurna Machhapuchhre | 148 | Modi | Annapurna Glacier | 28° 32' | 83° 57' | 3470 | 28° 31' | 83° 57' | 3670 |
| 5. Humla (closed) | 553 | | | 30° 16' | 81° 14' | 4220 | | | |
| 6. Humla | | Panom-mukhi (Daldung Khola) | | 30° 11' | 81° 32' | 3811 | 30° 11' | 81° 32' | 3500 |
| 7. Kanjirowa | 725 | Sano Bheri | | 29° 07' | 82° 36' | 2735 | 29° 07' | 82° 36' | 2600 |

Source: International Centre for Integrated Mountaineering Development, Inventory of Glaciers, Glacial Lakes and Glacial Lake Outburst Flood Nepal 2001 Department of Hydrology and Meteorology (Year Book, 1997, Supplement No. VII, 2000.)

Table 6.11 : Famous Glacial Lakes in Himalaya

| Description | Lower Barun | Imja | Tsho Rolpa | Thulagi | Dig Thso | Tam Pokhari |
|---|-------------|-----------|------------|-----------|-----------|-------------|
| Latitude | 27° 48' N | 27° 59' N | 27° 50' N | 28° 30' N | 27° 52' N | 27° 44' N |
| Longitude | 87° 07' E | 86° 56' E | 86° 28' E | 84° 30' E | 86° 35' E | 86° 15' E |
| Altitude (m) | 4570 | 5000 | 4580 | 4146 | 4365 | 4432 |
| Depth (m) | | | | | | |
| Average | 50 | 47 | 55.1 | 41.8 | 20 | 45 |
| Maximum | 118 | 99 | 131 | 81 | | |
| Length (km) | 1.250 | 1.3 | 3.2 | 2 | 1.21 | 1.15 |
| Width (km) | 0.6 | 0.5 | 0.5 | 0.45 | 0.44 | 0.5 |
| Area (sq. km) | 0.78 | 0.6 | 1.39 | 0.76 | 0.5 | 0.47 |
| Average water (10 ⁶ m ³) | 28 | 28 | 76.6 | 31.8 | 10 | 21.25 |
| Approximate age (year) | 35 | 45 | 45 | 45 | 50 | 45 |

Source: International Center for Integrated Mountain Development (Himalayan Wetlands- Risks, Challenges and Opportunities edited by Bishnu B. Bhandari (2007) and Gea Jae Joo based on Inventory of Glaciers, Glacial Lakes and Glacial Lake Outburst Flood (Nepal) – Pradip K. Mool, Samjwal R. Bajracharya and Sharad Joshi - 2000).

Table 6.12 : Glaciers and Glacial Lakes in Major River Basins

| Basins | Glaciers (sq. km) | | Glacial Lakes | |
|--------------|-------------------|--------------|---------------|---------------|
| | Number | Area | Number | Area (sq. km) |
| Koshi | 779 | 1,410 | 1,062 | 25.0 |
| Gandaki | 1,025 | 2,030 | 338 | 12.5 |
| Karnali | 1,361 | 1,740 | 907 | 37.7 |
| Mahakali | 87 | 143 | 16 | 0.4 |
| Total | 3,252 | 5,324 | 2,323 | 76 |

Source: International Center for Integrated Mountain Development (Himalayan Wetlands- Risks, Challenges and Opportunities edited by Bishnu B.Bhandari (2007) and Gea Jae Joo based on Inventory of Glaciers, Glacial Lakes and Glacial Lake Outburst Flood (Nepal) – Pradip K. Mool, Samjwal R. Bajracharya and Sharad Joshi - 2000).

Table 6.13 : Bacteriological Water Quality from Different Water Sources in the Kathmandu Valley

| Fecal Coliform (100 ml) | Value as % of Sample Unit of 15 | | | | | | |
|-------------------------|---------------------------------|--------------|-----------|--------|-------------|------|-------------|
| | Dug Well | Shallow Well | Deep Well | Spring | Stone Spout | Pond | Piped Water |
| 0 | 0 | 60 | 80 | 40 | 20 | 0 | 60 |
| 1-100 | 40 | 30 | 15 | 30 | 40 | 0 | 20 |
| 101-1000 | 30 | 5 | 5 | 30 | 40 | 0 | 20 |
| >1000 | 30 | 5 | 0 | 0 | 0 | 100 | 0 |

Source: Water and Energy Commission Secretariat (United Nations Environment Program, 2000 and Environment and Public Health Organization, 1999).

Table 6.14 : Water Quality of Different Water Sources in the Kathmandu Valley, 2005

| Parameters | Unit | Water sources | | | | WHO GV |
|----------------------------|-------------------|---------------|---------|--------|-------|----------|
| | | PW | PUTW | Well | SS | |
| pH | | 6.5-8.2 | 6.5-7.5 | 7.5 | 7.5 | 6.5-8.5 |
| Temp | °C | 13-18 | 12--15 | 15-18 | 15-18 | 25 |
| Iron | mg/l | ND-0.2 | 0.2 | 0.2 | 0.3 | 0.3-3.0 |
| Chlorine (mg/l) | mg/l | ND | ND | ND | ND | 0.2 |
| Chloride (mg/l) | mg/l | 10--30 | 22-45 | 26-27 | 23-45 | 250 |
| N-NH ₄ (mg/l) | mg/l | ND-0.2 | 0.2 | 0.2 | 0.2 | 0.04-0.4 |
| PO ₄ - P (mg/l) | mg/l | 0.1 | 0.1 | 0.1 | 0.1 | 0.4-5.5 |
| Coliform bacteria | Source points | +/- | + | + | + | - |
| Coliform bacteria | Consumption point | + | | | | - |
| E. coli | cfu/100 ml | 10-130 | 3--20 | 48-200 | 58 | 0 |

Note: PTW = private tap water, PUTW = public tap water, SS = stone spout, WHO GV = World Health Organization guideline value.

Source: Pradhan et al. 2005.

Table 6.15 : Water Quality of the Bisnumati River at Different Sites,1999

| Parameters | Unit | Sites | | | | | | |
|-------------------------------------|-----------|-------|------|----------|----------|-----------------------|------------------------|------------------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Temperature | °C | 19 | 16 | 16 | 19 | 21 | 23 | 27 |
| pH | | 7 | 7.1 | 7.5 | 7.5 | 7.7 | 7.8 | 7.8 |
| Conductivity | ms / cm | 20 | 21 | 50 | 106 | 461 | 487 | 566 |
| Turbidity | NTU | 2.9 | 2.9 | 7.5 | 20.9 | 43.3 | 40.8 | 40.7 |
| TSS | mg/l | 4.8 | 5.6 | 9.8 | 35.1 | 78 | 106.7 | 98.9 |
| Total hardness as CaCO ₃ | mg/l | 4.7 | 4.7 | 8.2 | 19.8 | 73.2 | 79.6 | 127.2 |
| Chloride | mg/l | 5.3 | 5.9 | 7.7 | 9.7 | 36.6 | 30.3 | 51.9 |
| Nitrogen ammonium | N - mg/l | 0.02 | 0.04 | 0.1 | 0.23 | 11.29 | 9.26 | 16.96 |
| Nitrogen nitrate | N - mg/l | 0.07 | 0.06 | 0.36 | 0.29 | 0.23 | 0.28 | 0.3 |
| Ortho- phosphate | N - mg/l | 0.05 | 0.05 | 0.1 | 0.13 | 1.11 | 1.17 | 1.64 |
| Total phosphorus | N - mg/l | 0.08 | 0.1 | 0.17 | 0.26 | 1.87 | 2.03 | 2.54 |
| Oxygen saturation | % | 87 | 87 | 83 | 82 | 28 | 25 | 24 |
| Dissolve oxygen | mg/l | 8.7 | 8.6 | 7.3 | 6.9 | 2.3 | 2 | 1.8 |
| BOD | mg/l | 1.2 | 1.5 | 2.4 | 4.1 | 48 | 50.2 | 61.3 |
| COD | mg/l | 10.9 | 11.4 | 20.3 | 27.3 | 122.5 | 127.6 | 152.9 |
| E. coli | cfu/100ml | 170 | 298 | 15.90x10 | 10.10x10 | 17.90x10 ⁵ | 18.40 x10 ⁶ | 13.20 x10 ⁶ |
| Total coliform | cfu/100ml | 1362 | 1774 | 37.80x10 | 91.40x10 | 50.20x10 ⁵ | 29.50 x10 ⁶ | 23.10 x10 ⁶ |
| Discharge | m/sec | 0.11 | 0.12 | 0.23 | 0.82 | 1.16 | 3.04 | 2.72 |

Source: Ministry of Population and Environment (Environment, 1999).

Table 6.16 : Water Quality of Major Rivers During Dry Season, 1998

| Location of River | pH | TDS (mg/l) | DO (mg/l) | BOD (mg/l) |
|--|---------|------------|-----------|------------|
| Mahakali at Pancheswor (Far Western Development Region) | 8.8 | 110 | 5 | 2 |
| Karnali at Chisapani (Far Western Development Region) | 8.9 | 264 | 10.5 | 1.5 |
| Bheri at Chatagaon (Mid Western Development Region) | 7.8 | 208 | 9.3 | 1.1 |
| Seti at Ramghat (Western Development Region) | 8.2 | 222 | 9.3 | 2 |
| East Rapti at Sauraha (Central Development Region) | 7.8 | 213 | 8.7 | 2.5 |
| Arun (Eastern Development Region) | 6.5 | 200 | 9.1 | 2.1 |
| Kankai (Eastern Development Region) | 7.7 | 60 | 8.7 | 2 |
| Mechi (Eastern Development Region) | 8.3 | 30 | 8.9 | 1.8 |
| WHO Guideline | 6.5-8.5 | 100 | >5.0 | 3 |

Source: Department of Hydrology and Meteorology, 1998 (Central Bureau of Statistics :A Compendium on Environment Statistics, Nepal, 1998.)

Table 6.17 : Water Quality of the East Rapti East River at Padnighat, Central Tarai, 1999

| Constituents | Unit | 1995 | 1996 | 1997 | 1998 |
|--------------|--------|------|------|------|------|
| Turbidity | NTU | 15 | 67 | 64 | 116 |
| Ammonia | mg/l-N | 110 | 225 | 370 | 125 |
| Nitrate | mg/l-N | 125 | 60 | 40 | 20 |
| Nitrite | mg/l-N | 2 | 16 | 3 | 4 |
| Phosphate | mg/l-P | 147 | 136 | 130 | 30 |

Source: Centre for Environment and Management, 1999.

Table 6.18 : Water Quality of the Bishnumati River in Tributaries and Sewage Disposal Sites

| Parameter | Unit | Tributaries Sites | | | Sewage Sites | | Industrial Sites |
|-------------------------------------|-----------|------------------------|------------------------|------------------------|--------------|-------|--------------------|
| | | 1 | 2 | 3 | 1 | 2 | 1 |
| Temperature | °C | 24 | 26 | 25 | 27 | 29 | 26 |
| pH | | 7.6 | 7.8 | 7.8 | 7.5 | 7.4 | 6.8 |
| Conductivity | ms / cm | 555 | 472 | 593 | 859 | 1169 | 602 |
| Turbidity | NTU | 53.1 | 25.3 | 43 | | | |
| TSS | mg/l | 63.9 | 60.5 | 56.2 | 552.5 | 294.8 | 1290 |
| Total hardness as CaCo ³ | mg/l | 77.3 | 134.4 | 130.7 | | | |
| Chloride | mg/l | 47.8 | 28.1 | 57 | | | |
| Nitrogen ammonium | N - mg/l | 15.08 | 15 | 17.99 | 35.6 | 38.94 | 16.39 |
| Nitrogen nitrate | N - mg/l | 0.23 | 0.26 | 0.23 | 0.02 | 0.02 | 0.03 |
| Ortho- phosphate | P - mg/l | 1.57 | 0.58 | 1.8 | 3 | 5.95 | 2.15 |
| Total phosphorus | P - mg/l | 2.65 | 0.91 | 2.74 | 3.83 | 6.73 | 2.45 |
| Oxygen saturation | % | 21 | 26 | 25 | | | |
| Dissolve oxygen | mg/l | 1.8 | 2.1 | 1.8 | 0.2 | 0.5 | 0.3 |
| BOD | mg/l | 69.2 | 37.9 | 62 | 107.5 | 347 | 233 |
| COD | mg/l | 164.7 | 77 | 156 | 255.5 | 621.5 | 504 |
| E. coli | cfu/100ml | 67.60 x10 ⁵ | 28.30 x10 ⁶ | 44.40 x10 ⁵ | | | 11x10 ⁵ |
| Total coliform | cfu/100ml | 35.60 x10 ⁵ | 61.70 x10 ⁶ | 62.90 x10 ⁵ | | | 13x10 ⁵ |
| Discharge | m/sec | 231 | 0.36 | 296 | 0.57 | 0.04 | 0.33 |

Source: Ministry of Population and Environment (Environment, 1999).

Table 6.19 : Tolerance Limits for Different Industrial Effluents Discharged into Inland Surface Water

| Characteristics | Land Surface Water | Public Sewerage | Inland Surface Water |
|--|---|-----------------|---|
| Total Suspended solids, mg/l, Max | 30-200 | 600 | 50 |
| Particle size of total suspended particles | Shall pass 850-micron sieve | | Shall pass 850-micron sieve |
| pH value | 5.5-9.0 | 5.5-9.0 | 5.5-9.0 |
| | Shall not exceed 40 degree C in any section of the stream within 15 meters downstream from the effluent outlet. | | Shall not exceed 40 degree C in any section of the stream within 15 meters downstream from the effluent outlet. |
| Temperature, °C , Max | | 45 | |
| Total Chromium, mg/l, Max | - | 2 | |
| Sulphates (SO ₄), mg/l, Max | | 500 | |
| Total Dissolved Solids, mg/l, Max | - | 2100 | |
| Biochemical oxygen demand (BOD) for 5 days at 20 degree C, mg/l, Max | 50 | 400 | 50 |
| Oils and grease, mg/l, max | 10 | 50 | 10 |
| Phenolic compounds, mg/l, max | 1 | 10 | 1 |
| Cynides (as CN), mg/l, max | 0.2 | 2 | 0.2 |
| Sulphides (as S), mg/l, max | 2 | 2 | 2 |
| Radioactive materials | | | |
| a. Alpha emitters, c/ml, max | 10 ⁻⁷ | | 10 ⁻⁷ |
| b. Beta emitters, c/ml, max | 10 ⁻⁸ | | 10 ⁻⁸ |
| Insecticides | absent | absent | absent |
| Total residual chlorine, mg/l | 1 | | 1 |
| Fluorides (as F), mg/l, max | 2 | 10 | 2 |
| Arsenic (as AS), mg/l, max | 0.2 | 1 | 0.2 |
| Cadmium (as Cd), mg/l, max | 2 | 2 | 2 |
| Hexavalent chromium (as Cr,) mg/l max | 0.1 | | 0.1 |
| Copper (as Cu), mg/l, max | 3 | 3 | 3 |
| Lead (as pb), mg/l, max | 0.1 | 0.1 | 0.1 |
| Nickel (as Ni), mg/l, max | 3 | 3 | 3 |
| Selenium (as Se), mg/l, max | 0.05 | 0.05 | 0.05 |
| Zinc (as Zn), mg/l, max | 5 | 5 | 5 |
| TDS, mg/l, max | | | |
| Chloride (Cl), Mg/l, max | | | |
| Soleplate (SO ₄), mg/l, max | | | |
| Mercury (as Hg) mg/l, max | 0.01 | 0.01 | 0.01 |
| Mineral oils, mg/l, max | | 10 | |
| Inhibition of nitrification test at 2000 ml/l | | <50% | |
| Sodium, % max | | | |
| Ammonical nitrogen, mg/l, max | 50 | 50 | 50 |
| Chemical Oxygen Demand, mg/l, max | 250 | 1000 | 250 |
| Silver, mg/l, max | 0.1 | 0.1 | 0.1 |

Source : Nepal Gazette , 2058/01/17 (30 April 2001) and 2060/ 03/09 (23 June 2003).

Table 6.20 : Generic Standard /Tolerance Limits for Different Industrial Effluents Discharged into Inland Surface Water

| Characteristics | Environmental Standard and Norms, 1/6/1999 | | | | | | | | | | |
|--|--|--------------------------|--------------------|-------------------------------|-----------------------|----------------|----------------|-----------------------------|---------------|---|---------------------------------|
| | Tanning Industry | Wool Processing Industry | Fermentat Industry | Vegetable Ghee & Oil Industry | Paper & Pulp Industry | Dairy Industry | Sugar Industry | Cotton and Textile Industry | Soap Industry | Brick kiln Industry | |
| | | | | | | | | | | Suspended Particulate Matter (Max. Limit) | Heights of Chimney (Max. Limit) |
| TSS mg/l | 100 | 100 | 100 | | 100 | 150 | 100 | 100 | 200 | | |
| Particle Size of TSS | | | | | | | | | | | |
| pH value | 5.5-9.0 | 5.5-9 | 5.5-9 | 5.5-9.0 | 5.5-9 | 5.5-8.5 | 5.5-9 | 6.0-9.0 | 5.5-9.0 | | |
| Temperature °C | | 40 | | | | | | | | | |
| TDS, mg/l, max | 2100 | | | | | | | | | | |
| Color and Odor | Absent * | | | | | | | | | | |
| BOD for 5 days at 200 degree C, mg/l, max | 100 | 100 | 60 | 100 | 100 | 100 | 100 | 100 | 100 | | |
| Oils and grease, mg/l, max | | 10 | | 10 | | 10 | | | 10 | | |
| Cyanides (as CN), mg/l, max | | 5 (as C6 h5 OH) | 101 | | | | | | | | |
| Sulphides (as S), mg/l, max | 2 | 2 | | | | | | | | | |
| Radioactive materials; | | | 5.5-10 | | | | | | | | |
| Total residual Chlorine, mg/l | | | 61 | | | | | | | | |
| Nickel (as Ni), mg/l, max | | | | 3 | | | | | | | |
| Chlorides (as Cl), mg/l, max | 600 | | | | | | | | | | |
| Sodium, % max | 60 | | | | | | | | | | |
| Chemical oxygen demand mg/l, Max | 250 | 250 | | 250 | | 250 | 250 | 250 | 250 | | |
| Total chromium (as Cr) mg/l, max | 2 | 2 | | | | | | | | | |
| Bull's Trench Kiln, Forced Draught (Fixed Chimney) | | | | | | | | | | 600mg/Nm ³ | 17 Meter |
| Bull's Trench Kiln, Natural Draught (Fixed Chimney) | | | | | | | | | | 700mg/Nm ³ | 30 Meter |
| Vertical Shaft Brick Kiln (VSBK) | | | | | | | | | | 400mg/Nm ³ | 15 Meter |
| Hexavalent chromium (as Cr) mg/l, Max | 0.1 | | | | | | | | | | |
| Phenolic compounds (as C ₆ h ₅ OH), mg/l | | 5 | | | | | | | 1 | | |
| Temperature °C | | 40 | | | | | | | | | |

Source: Nepal Gazette (2058/01/17 (30 April 2001) and 2060/ 03/09 (23 June 2003)).

Table 6.21 : Nepal's Drinking Water Quality Standards

| Group | Parameter | Unit | Maximum Concentration Limits |
|--------------------|-------------------------|-----------|------------------------------|
| Physical | Turbidity | NTU | 5 (10)** |
| | pH | | 6.5-8.5* |
| | Color | TCU | 5 (15)** |
| | Taste & Odor | | Would not be objectionable |
| | Total Dissolved Solids | mg/l | 1000 |
| | Electrical Conductivity | µc/cm | 1500 |
| | Iron | mg/l | 0.3 (3)** |
| | Manganese | mg/l | 0.2 |
| | Arsenic | mg/l | 0.05 |
| | Cadmium | mg/l | 0.003 |
| | Chromium | mg/l | 0.05 |
| | Cyanide | mg/l | 0.07 |
| | Fluoride | mg/l | 0.5-1.5* |
| | Lead | mg/l | 0.01 |
| | Ammonia | mg/l | 1.5 |
| Chemical | Chloride | mg/l | 250 |
| | Sulphate | mg/l | 250 |
| | Nitrate | mg/l | 50 |
| | Copper | mg/l | 1 |
| | Total Hardness | mg/l | 500 |
| | Calcium | mg/l | 200 |
| | Zinc | mg/l | 3 |
| | Mercury | mg/l | 0.001 |
| | Aluminum | mg/l | 0.2 |
| | Residual Chlorine | mg/l | 0.1-0.2* |
| Micro Germs | E-Coli | MPN/100ml | 0 |
| | Total Coli form | MPN/100ml | 95 % in sample |

Note : * These standards indicate the maximum and minimum limits.

** Figures in parenthesis are upper range of the standards recommended.

Source : Ministry of Physical Planning (Nepal Gazette (B.S. 2063/03/12)).

Table 6.22 : Nepal Water Quality Guidelines for Irrigation Water

Microbiological constituents:

| S.N. | Parameter name | Target Water Quality Range | Remarks |
|------|-------------------|----------------------------|---|
| 1. | Coliforms(faecal) | < 1 count /100 ml | 1 – 1000 count / 100 ml could be used for plants for which edible parts are not wetted. |

Physical Constituents:

| S.N. | Parameter name | Target Water Quality Range | Remarks |
|------|-------------------------|----------------------------|--|
| 1 | pH | 6.5 – 8.5 | Adverse effect on plants outside this range |
| 2. | Suspended Solids | < 50 mg/l | Above the limit problem with sedimentation and irrigation system |
| 3. | Electrical Conductivity | < 40 mS/m | Upto 540 mS/m depending upon sensitivity of crops. |
| | | | |

Chemical Constituents:

| S.N. | Parameter name | Target Water Quality Range | Remarks |
|------|--------------------------------|----------------------------|---|
| 1. | Aluminium | < 5 mg/l | Upto 20 mg/l max. acceptable conc. |
| 2. | Arsenic | < 0.1 mg/l | > 2 mg/l creates severe problem |
| 3. | Beryllium | < 0.1 mg/l | 0.1 – 0.5 mg/l max. acceptable conc. |
| 4. | Boron | < 0.5 mg/l | Upto 15 mg/l depending upon species. |
| 5. | Cadmium | < 0.01 mg/l | 0.01 – 0.05 mg/l max. acceptable conc. |
| 6. | Chloride | < 100 mg/l | Upto 700 mg/l depending upon species |
| 7. | Chromium | < 0.1 mg/l | Upto 1.0 mg/l max. acceptable conc. |
| 8. | Cobalt | < 0.05 mg/l | Upto 5.0 mg/l max. acceptable conc. |
| 9. | Copper | < 0.2 mg/l | Upto 5.0 mg/l max. acceptable conc. |
| 10. | Fluoride | < 2.0 mg/l | Upto 15 mg/l max. acceptable conc. |
| 11. | Iron | < 5.0 mg/l (non-toxic) | > 1.5 mg/l creates problem in drip irrigation system |
| 12. | Lead | < 0.2 mg/l | Upto 2.0 mg/l max. acceptable conc. |
| 13. | Lithium | < 2.5 mg/l | For citrus < 0.75 mg/l |
| 14. | Manganese | < 0.02 mg/l | Upto 10 mg/l max. acceptable conc. |
| 15. | Molybdenum | < 0.01 mg/l | Upto 0.05 mg/l max. acceptable conc. |
| 16. | Nickel | < 0.2 mg/l | Upto 2.0 mg/l max. acceptable conc. |
| 17. | Nitrogen (inorganic) | < 5 mg/l | Higher concentration may affect sensitive plants and may contaminate ground water |
| 18. | Selenium | < 0.02 mg/l | Upto 0.05 mg/l max. acceptable conc. |
| 19. | Sodium Adsorption Ratio (SAR) | < 2.0 | Upto 10 depending upon sensitivity of crops. |
| 20. | Sodium | < 70 mg/l | Upto 460 depending upon sensitivity of crops |
| 21. | Total Dissolved Solids (as EC) | < 40 mS/m | Upto 540 mS/m depending upon sensitivity of crops |
| 22. | Uranium | < 0.01 mg/l | Upto 0.1 mg/l max. acceptable conc. |
| 23. | Vanadium | < 0.1 mg/l | Upto 1.0 mg/l max. acceptable conc. |
| 24. | Zinc | < 1.0 mg/l | Upto 5 mg/l max. acceptable conc. |

Source : Department of Irrigation, Ground Water Project (Nepal Gazette (Number 10, B.S., 2065-03-02)).

Table 6.23 : Nepal Water Quality Guidelines for Aquaculture

| S. N. | Constituents | Target Water Quality Range | | Remarks |
|-------|-------------------------------|---|------------|---|
| 1 | Algae | No criteria | | |
| 2 | Alkalinity | 20 – 100 mg/l as CaCO ₃ | | High alkalinity reduces natural food production in ponds below optimal production |
| 3 | Aluminium | < 30µg/L (pH >6.5), < 10 µg/L (pH < 6.5) | | Highly toxic to trouts (1.5 µg/l is fatal to brown trout) |
| 4 | Ammonia (for cold water fish) | 0 – 25 µg/L | | |
| 5 | Ammonia (for warm water fish) | 0 – 30 µg/L | | |
| 6 | Arsenic | 0 – 0.05 mg/l | | |
| 7 | Bacteria (E. Coli) | < 10 counts of E.coli /g of fish flesh | | |
| 8 | BOD ₅ | < 15 mg/l | | |
| 9 | Cadmium | Hardness: 0– 60 mg/l | < 0.2 mg/l | Cadmium toxicity depends upon hardness of water |
| | | Hardness: 60–120 mg/l | < 0.8 mg/l | |
| | | Hardness: 120–180mg/l | < 1.3 mg/l | |
| | | Hardness: >180 mg/l | < 1.8 mg/l | |
| 10 | Carbon dioxide | < 12 mg/l, upto 75 mg/l for warm water fish | | |
| 11 | Chloride | Value not recommended (fish can survive at < 600 mg/l Chloride but the production is not optimum) | | |
| 12 | Chlorine | < 2 µg HOCl /L for cold water fish | | |
| | | < 10 µg HOCl/L for warm water fish | | |
| 13 | Chromium (VI) | < 20 µg/L | | |
| 14 | COD | < 40 mg/l | | |
| 15 | Colour | < 100 Pt-Co unit | | |
| 16 | Copper | < 5 µg/L | | 0.006 and 0.03 µg/L are upper limits for hard and soft water |
| 17 | Cyanides | < 20 µg/L as HCN | | LC ₅₀ starts from 100 µg/L upwards |
| 18 | Dissolved oxygen | 6 – 9 mg/l for cold water species | | |
| | | 5 – 8 for intermediate water species, | | |
| | | 5 – 8 for warm water species. | | |
| 19 | Fluoride | < 20 µg/l | | |
| 20 | Iron | < 10 µg/l | | 0.2 - 1.75 general lethal threshold for fish |
| 21 | Lead | < 10 µg/l | | 30 µg/L max. conc. limit for brook trout |
| 22 | Magnesium | < 15 mg/l | | |
| 23 | Manganese | < 100 µg/l | | Above 500 µg/L increasing risk of lethal effect |
| 24 | Mercury | < 1 µg/l | | Bioaccumulation and biomagnification occurs |
| 25 | Nickel | < 100 µg/l | | |
| 26 | Nitrate-N | < 300 mg/l | | 1000 mg/l is below the 96-hour LC ₅₀ values for most fish |
| 27 | Nitrite-N | 0 – 0.05 mg/l for cold water fish | | > 7 mg/l is LC ₅₀ for many fish species |
| | | 0.06 - .25 mg/l for warm water fish | | |

Table 6.23 : Nepal Water Quality Guidelines for Aquaculture (contd...)

| S. N. | Constituents | Target Water Quality Range | | Remarks | |
|-------|--|--|-----------|---|-----------------------------------|
| 28 | Nuisance plants | Less than 10 % of the fish pond should be covered by aquatic plants. | | | |
| 29 | Oils and Greese (including Petrochemicals) | < 300 µg/L | | | |
| 30 | PCBs | No quantitative guidelines, should not be detected in fish | | | |
| 31 | pH | 6.5 – 9.0 | | Outside this range the health of fish is adversely affected | |
| 32 | Phenols | < 1 mg/l | | > 7.5 mg/l 24 hr. LC ₅₀ starts for most fish | |
| 33 | Phosphorus | < 0.6 mg/l as orthophosphate | | > 12.5 mg/l 96 hr. LC ₅₀ starts for most fish | |
| 34 | Selenium (VI) | < 0.3 mg/l | | | |
| 35 | Sulphide as H ₂ S | < 0.001 mg/l | | > 0.002 mg/l long term health hazard for fish | |
| 36 | Temperature | 4 – 18 for cold water fish | | Mortality increases with increasing TGP | |
| | | 16 – 32 for intermediate species | | | |
| | | 24 – 30 for warm water fish | | | |
| 37 | Total Dissolved Gases as Total Gas Pressure (TGP) | < 100 % for cold water fish | | | |
| | | < 105 % for warm water fish | | | |
| 38 | Total Dissolved Solids | < 2000 mg/l | | | |
| 39 | Total Hardness as CaCO ₃ | 20 – 100 mg/l , | | In > 175 mg/l osmoregulation of fish is affected. | |
| 40 | Total Suspended Matter. | < 20000 mg/l for turbid water species, | | | |
| | | < 25 NTU for clear water species | | | |
| 41 | Zinc, depends upon water hardness: mg/l dissolved Zn | Hardness: | Coldwater | Warm water | Warm water fish are more tolerant |
| | | 10 mg/l | 0.03 | 0.3 | |
| | | 50 mg/l | 0.2 | 0.7 | |
| | | 100 mg/l | 0.3 | 1 | |
| | | 500 mg/l | 0.5 | 2 | |

Pesticides: No guideline values provided.

Source : Department of Irrigation, Ground Water Project (Nepal Gazette (Number 10, B.S., 2065-03-02)).

Table 6.24 : Nepal Water Quality Guidelines for Livestock Watering

| S.N. | Constituent | Proposed concentration |
|--|-------------------------|---|
| 1. | Algae | No visible blue-green scum |
| 2. | Aluminium | < 5 mg/l |
| 3. | Arsenic | < 0.2 mg/l |
| 4. | Beryllium | < 0.1 mg/l |
| 5. | Boron | < 5 mg/l |
| 6. | Cadmium | < 0.01 mg/l |
| 7. | Calcium | < 1000 mg/l |
| 8. | Chloride | |
| 9. | Chromium (VI) | < 1 mg/l |
| 10. | Cobalt | < 1 mg/l |
| 11. | Copper | < 0.5 mg/l |
| 12. | Electrical Conductivity | < 1.5 dS/m |
| 13. | Fluoride | < 2 mg/l |
| 14. | pH | 6.5 – 8.5 |
| 15. | Iron | Not Toxic |
| 16. | Lead | < 0.1 mg/l |
| 17. | Magnesium | < 500 mg/l |
| 18. | Manganese | < 10 mg/l |
| 19. | Mercury | < 10 µg/L |
| 20. | Molybdenum | < 0.01 mg/l |
| 21. | Nickel | < 1 mg/l |
| 22. | Nitrate/Nitrite | < 100 mg/l as nitrate |
| 23. | Nitrite – N | < 10 mg/l |
| 24. | Selenium | < 0.05 mg/l |
| 25. | Sodium | < 2000 mg/l |
| 26. | Sulphate | < 1000 mg/l |
| 27. | Total Dissolved Solids | |
| | Dairy Cattle | < 7100 mg/l |
| | Sheep | < 12800 mg/l |
| | Horse | < 6400 mg/l |
| | Pigs | < 4300 mg/l |
| | Poultry | < 2800 mg/l |
| 28. | Vanadium | < 0.1 mg/l (FAO) |
| 29. | Zinc | < 24 mg/l (FAO) |
| Pathogens: | | |
| 1. | Faecal coliform count | < 200 count /100ml < 1000 counts for < 20 % of the samples |
| Pesticides: Guidelines applicable for human beings. | | |
| Chlorinated Hydrocarbons: Guidelines for human beings apply. | | |

Source : Department of Irrigation, Ground Water Project (Nepal Gazette (Number 10, B.S., 2065-03-02))

Table 6.25 : Nepal Water Quality Guidelines for Recreation

Biological Parameters:

Biological Parameters:

| S.N. | Parameter Name: | Full contact | Partial contact | Non contact |
|---|--|--|--|--------------------------------------|
| 1 | Algae, macrophytes, phytoplankton scum, etc. | Should not be present in excessive amount | | |
| Indicator Organism | | | | |
| | Total coliform Bacteria | | | |
| | Faecal coliform | <130 count/100 ml | <1000 count/100ml | No target value |
| | Escherichia coli | <130 count/100 ml | No target value | No target value |
| | Enterococci | | | |
| | Faecal Streptococci | <30 count/100 ml | 0 – 230 count/100 ml | No target value |
| | Coliphage | < 20 count/100 ml | No target value | No target value |
| | Schistosoma/ Bilharzia | No snails capable of acting as the intermediate host of the bilharzia parasite | No snails capable of acting as the intermediate host of the bilharzia parasite | No target value |
| Nuisance plants | | | | |
| | | Swimmer should not be entangled | Boats should not be entangled. | |
| Chemical Irritant | | | | |
| The criteria are qualitative and no specific irritant and quantitative measures are given | | | | |
| Chemical Parameters: | | | | |
| | pH | 6.5 – 8.5 | 6.5 – 8.5 | No target value |
| Physical Parameters: | | | | |
| 1. | Clarity | > 1.6 (Sechchi disc depth Metres) | No target value | No target value |
| 2. | Colour | 100 Pt-Co units | 100 Pt-Co units | No Target value |
| 3. | Floating Matter and refuse | Free of floating or submerged debris | No target value | No target value |
| 4. | Odour | No objectionable or unpleasant odour | No objectionable or unpleasant odour | No objectionable or unpleasant odour |
| 5. | Residual Chlorine | 0.1 mg/l | No target value | No target value |
| 6. | Surface films | Should not be noticeable | Should not be noticeable | Should not be noticeable |
| 7. | Turbidity | 0.5 NTU | | |

Source : Department of Irrigation, Ground Water Project (Nepal Gazette (Number 10, B.S., 2065-03-02)).

Table 6.26 : Nepal Water Quality Guidelines for Industries

| S. N. | Parameter Name: | Recommended value | | | |
|-------|------------------------|----------------------------------|---------------------------------|---------------------------------|----------------------------------|
| | | Category 1 | Category 2 | Category 3 | Category 4 |
| 1 | Alkalinity | <50 mg/l | < 120 mg/l | < 300 mg/l | < 1200 mg/l |
| 2 | COD | < 10 mg/l | < 15 mg/l | < 30 mg/l | < 75 mg/l |
| 3 | Chloride | < 20 mg/l | < 40 mg/l | < 100 mg/l | < 500 mg/l |
| 4 | Iron | < 0.1 mg/l | < 0.2 mg/l | < 0.3 mg/l | < 10 mg/l |
| 5 | Manganese | < 0.05 mg/l | < 0.1 mg/l | < 0.2 mg/l | < 10 mg/l |
| 6 | pH | 7.0 - 8.0 | 6.5 - 8.0 | 6.5 - 8.0 | 5 - 10 |
| 7 | Silica | < 5 mg/l | 0 - 10 mg/l | < 20 mg/l | < 150 mg/l |
| 8 | Sulphate | < 30 mg/l | < 80 mg/l | < 200 mg/l | < 500 mg/l |
| 9 | Suspended solids | < 3 mg/l | < 5 mg/l | < 5 mg/l | < 25 mg/l |
| 10 | Total dissolved solids | TDS: < 100 mg/l EC: < 15 mS/m | TDS: < 200 EC: < 30 | TDS: < 450 EC: < 70 | TDS: < 1600 EC: < 250 |
| 11 | Total Hardness | < 50 mg/l as CaCO ₃ | < 100 mg/l as CaCO ₃ | < 250 mg/l as CaCO ₃ | < 1000 mg/l as CaCO ₃ |

Source : Department of Irrigation, Ground Water Project (Nepal Gazette (Number 10, B.S., 2065-03-02)).

Table 6.27 : Nepal Water Quality Guidelines for the Protection of Aquatic Ecosystem

| S.N. | Parameter name | | Target Water Quality Range | Chronic Effect Value | Acute Effect Value |
|------|---------------------------------|------------------------------|----------------------------|----------------------|--------------------|
| 1. | Aluminium (mg/l) | | At pH <6.5: 5 | 10 | 100 |
| | | | At pH >6.5:10 | 20 | 150 |
| 2. | Ammonia (µg/L) | | < 7 | < 15 | < 100 |
| 3. | Arsenic (µg/L) | | < 10 | < 20 | < 130 |
| 4. | Atrazine (µg/L) | | < 10 | < 19 | < 100 |
| 5. | Cadmium | | | | |
| | Soft water | (60 mg/l CaCO ₃) | < 0.15 | 0.3 | 3 |
| | Medium water | (60 – 119 mg/l) | < 0.25 | 0.5 | 6 |
| | Hard water | 120 – 180 mg/l | < 0.35 | 0.7 | 10 |
| | Very Hard | > 180 mg/l | < 0.40 | 0.8 | 13 |
| 6. | Chlorine (Residual) µg/L | | < 0.2 | 0.35 | 5 |
| 7. | Chromium (VI) µg/L | | 7 | 10 | 200 |
| 8. | Chromium (III) µg/L | | < 12 | 24 | 340 |
| 9. | Copper µg/L | | | | |
| | Soft water | (60 mg/l CaCO ₃) | < 0.3 | 0.53 | 1.6 |
| | Medium water | (60 – 119 mg/l) | < 0.8 | 1.5 | 4.6 |
| | Hard water | 120 – 180 mg/l | < 1.2 | 2.4 | 7.5 |
| | Very Hard | > 180 mg/l | < 1.40 | 2.8 | 12 |
| 10. | Cyanide µg/L | | 1 | 4 | 110 |
| 11. | Dissolved Oxygen (% saturation) | | 80 – 120 | > 60 | > 40 |

Table 6.27 : Nepal Water Quality Guidelines for the Protection of Aquatic Ecosystem (contd...)

| S.N. | Parameter name | | Target Water Quality Range | Chronic Effect Value | Acute Effect Value |
|------|---|------------------------------|---|----------------------|--------------------|
| 12. | Endosulphan (µg/L) | | < 0.01 | 0.02 | 0.2 |
| 13. | Fluoride (µg/L) | | < 750 | 1500 | 2540 |
| 14. | Iron | | The iron concentration should not be allowed to vary by more than 10 % of the background dissolved iron concentration for a particular site or case, at a specific time. | | |
| 15. | Lead µg/L | | | | |
| | Soft water | (60 mg/l CaCO ₃) | < 0.2 | 0.5 | 4 |
| | Medium water | (60 – 119 mg/l) | < 0.5 | 1.0 | 7 |
| | Hard water | 120 – 180 mg/l | < 1.0 | 2.0 | 13 |
| | Very Hard | > 180 mg/l | < 1.2 | 2.4 | 16 |
| 16. | Manganese (µg/L) | | < 180 | 370 | 1300 |
| 17. | Mercury (µg/L) | | < 0.04 | 0.08 | 1.7 |
| 18. | Nitrogen (inorganic) | | <p>Inorganic nitrogen concentrations should not be changed by more than 15 % from that of the water body under local unimpacted conditions at any time of the year;</p> <p>The trophic status of the water body should not increase above its present level, though a decrease in trophic status is permissible (see <i>Effects</i>);</p> <p>The amplitude and frequency of natural cycles in inorganic nitrogen concentrations should not be changed.</p> | | |
| 19. | pH | | | | |
| | All aquatic ecosystems | | pH values should not be allowed to vary from the range of the background pH values for a specific site and time of day, by > 0.5 of a pH unit, or by > 5 %, and should be assessed by whichever estimate is more conservative. | | |
| 20. | Phenols (µg/l) | | <30 | 60 | 500 |
| 21. | Phosphorus (inorganic) All surface waters | | <p>Inorganic phosphorus concentrations should not be changed by > 15 % from that of the water body under local, unimpacted conditions at any time of the year;</p> <p>The trophic status of the water body should not increase above its present level, though a <i>decrease</i> in trophic status is permissible (see <i>Effects</i>);</p> <p>The amplitude and frequency of natural cycles in inorganic phosphorus concentrations should not be changed.</p> | | |
| 22. | Selenium (µg/l) | | < 2 | 5 | 30 |
| 23. | Temperature (All aquatic ecosystems) | | Water temperature should not be allowed to vary from the background average daily water temperature considered to be normal for that specific site and time of day, by > 2 °C, or by > 10 %, whichever estimate is the more conservative. | | |
| 24. | Total Dissolved Solids (All inland waters) | | <ul style="list-style-type: none"> • TDS concentrations should not be changed by > 15 % from the normal cycles of the water body under un impacted conditions at any time of the year; • The amplitude and frequency of natural cycles in TDS concentrations should not be changed. | | |
| 25. | Total Suspended Solids (All inland waters) | | Any increase in TSS concentrations must be limited to < 10 % of the background TSS concentrations at a specific site and time. | | |
| 26. | Zinc (µg/l) | | < 2 | 3.6 | 36 |

Source: Department of Irrigation, Ground Water Project (Nepal Gazette (Number 10, B.S., 2065-03-02)).

Chapter VII

Other Natural Resources

Table 7.1 : Numbers of Threatened Species by Major Groups of Organisms, 1996 – 2004

| Major Group of Species | Number of described species | Number of species evaluated in 2004 | Number of threatened species in 1996/98 | Number of threatened species in 2000 | Number of threatened species in 2002 | Number of threatened species in 2003 | Number of threatened species in 2004 | Number of threatened in 2004, as % of species described | Number of threatened in 2004, as % of species evaluated |
|------------------------|-----------------------------|-------------------------------------|---|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|---|---|
| Vertebrates | | | | | | | | | |
| Mammals | 5,416 | 4,853 | 1,096 | 1,130 | 1,137 | 1,130 | 1,101 | 20 | 23 |
| Birds | 9,917 | 9,917 | 1,107 | 1,183 | 1,192 | 1,194 | 1,213 | 12 | 12 |
| Reptiles | 8,163 | 499 | 253 | 296 | 293 | 293 | 304 | 4 | 61 |
| Amphibians | 5,743 | 5,743 | 124 | 146 | 157 | 157 | 1,770 | 31 | 31 |
| Fishes | 28,500 | 1,721 | 734 | 752 | 742 | 750 | 800 | 3 | 46 |
| Sub total | 57,739 | 22,733 | 3,314 | 3,507 | 3,521 | 3,524 | 5,188 | 9 | 23 |
| Invertebrates | | | | | | | | | |
| Insects | 950,000 | 771 | 537 | 555 | 557 | 553 | 559 | 0.06 | 73 |
| Mollusks | 70,000 | 2,163 | 920 | 938 | 939 | 967 | 974 | 1 | 45 |
| Crustaceans | 40,000 | 498 | 407 | 408 | 409 | 409 | 429 | 1 | 86 |
| Others | 130,200 | 55 | 27 | 27 | 27 | 30 | 30 | 0.02 | 55 |
| Sub total | 1,190,200 | 3,487 | 1,891 | 1,928 | 1,932 | 1,959 | 1,992 | 0.17 | 57 |
| Plants | | | | | | | | | |
| Mosses | 15,000 | 93 | --- | 80 | 80 | 80 | 80 | 0.5 | 86 |
| Ferns and allies | 13,025 | 210 | --- | --- | --- | 111 | 140 | 1 | 67 |
| Gymnosperms | 980 | 907 | 142 | 141 | 142 | 304 | 305 | 31 | 34 |
| Dicotyledons | 199,350 | 9,473 | 4,929 | 5,099 | 5,202 | 5,768 | 7,025 | 4 | 74 |
| Monocotyledons | 59,300 | 1,141 | 257 | 291 | 290 | 511 | 771 | 1 | 68 |
| Sub total | 287,655 | 11,824 | 5,328 | 5,611 | 5,714 | 6,774 | 8,321 | 2.89 | 70 |
| Others | | | | | | | | | |
| Lichens | 10,000 | 2 | --- | --- | --- | 2 | 2 | 0.02 | 100 |
| Sub total | 10,000 | 2 | --- | --- | --- | 2 | 2 | 0.02 | 100 |
| Total | 1,545,594 | 38,046 | 10,533 | 11,046 | 11,167 | 12,259 | 15,503 | 1 | 41 |

Source : The World Conservation Union (Global Species Assessment (Red List, 2004).

Table 7.2 : Threatened Faunal Species

(in number)

| Animal groups | World | Nepal | Percent in Nepal |
|---------------|-------|-------|------------------|
| Fishes | 979 | 0 | 0 |
| Amphibians | 169 | 0 | 0 |
| Reptiles | 316 | 9 | 2.85 |
| Birds | 970 | 22 | 2.27 |
| Mammals | 741 | 28 | 3.78 |
| Invertebrates | 2754 | 2 | 0.07 |

Source: The World Conservation Union Nepal, 1995.

Table 7.3 : Ecosystems and Protected Areas

| Physiographic Zone | No. of Total Ecosystems | Number of Protected Areas |
|--------------------|-------------------------|---------------------------|
| Tarai (Plain) | 10 | 10 |
| Siwalik Hill | 13 | 5 |
| Middle Hill | 52 | 33 |
| Highland | 38 | 30 |
| Others | 5 | 2 |
| Total | 118 | 80 |

Source: Ministry of Forests and Soil Conservation, 2002 (Nepal Biodiversity Strategy).

Table 7.4 : Plant and Animal Species in the World and in Nepal

| Group | World Number | Nepal | Percent in Nepal |
|-------------------------|--------------|-------|------------------|
| Floral Diversity | | | |
| Flowering Plants | 231638* | 3991 | 2.76 |
| Pteridophytes | 10369* | 534 | 5.15 |
| Lichens | > 17000** | 471 | 2.77 |
| Bryophytes | >14000** | 668 | 4.77 |
| Fungi | > 70000** | 1882 | 2.69 |
| Algae | > 40000** | 687 | 1.72 |
| Totals | > 403000 | 10633 | 2.8 |
| Faunal Diversity | | | |
| Mammals | 4675+ | 185 | 3.96 |
| Birds | 9799 & | 874 | 8.9 |
| Herpeto | 12650 | 195 | 1.94 |
| Amphibians | 4780+ | 118 | 2.47 |
| Reptiles | 4870+ | 78 | 0.99 |
| Fishes | 10000^ | 187 | 1.87 |
| Butterflies | 17500# | 651 | 3.72 |
| Moths | 160000# | 785 | 0.49 |
| Spiders | 39490* | 175 | 0.44 |

*UNEP- WCMC 2006 and Platnick, NI 2006 ** WCMC 1992, # Malla and Shakya 1998 and Smithsonian institution 2007, + UETZp. 2000, & Bird life international 2006, ^ IUCN 2003

Source : Ministry of Environment, Science and Technology (Nepal Biodiversity Resource Book, 2007).

Table 7.5 : Number of Flowering Plant Species and Endemic Plants in the Protected Areas

| Area | Number of Species | Number of Endemic Plants |
|-----------------------------|-------------------|--------------------------|
| A. National Parks | | |
| Chitawan | 919 | 0 |
| Sagarmatha | 1074 | 11 |
| Langtang | 3689 | 15 |
| Shey Phoksundo | 1579 | 30 |
| Rara | 1070 | 16 |
| Khaptad | 567 | 4 |
| Bardia | 839 | 0 |
| Makalu Barun NP | 3073 | 7 |
| Shivapuri | 2122 | 16 |
| B. Wildlife Reserves | | |
| Shuklaphanta** | 700 | 0 |
| Koshi Tappu | 237 | 1 |
| Parsa | | NA |
| C. Hunting Reserve | | |
| Dhorpatan | 1150 | 36 |
| D. Conservation Area | | |
| Annapurna | 3430 | 56 |
| Makalu Barun | | NA |
| Kanchanghangha | >3000 | 23 |
| Manaslu | >2500 | NA |

Source: Ministry of Forests and Soil Conservation (* Shrestha and Joshi (1995), Nepal Biodiversity Strategy, 2002).

Table 7.6 : Number of Cultivated and Wild Food Plant Species

| Groups | Food Plant Species | Cultivated Plants | Cultivated Plants (%) | Wild Food Plants+ | Wild Food Plant (%) |
|---------------------|--------------------|-------------------|-----------------------|-------------------|---------------------|
| Dicots | | | | | |
| Families | 120 | 50 | 42 | 70 | 58 |
| Genera | 180 | 120 | 67 | 60 | 33 |
| Species* | 395 | 175 | 44 | 190 | 48 |
| Sub-species | 25 | 25 | 100 | 0 | 0 |
| Monocot | | | | | |
| Families | 17 | 10 | 59 | 7 | 41 |
| Genera | 50 | 35 | 70 | 15 | 30 |
| Species* | 83 | 50 | 60 | 20 | 24 |
| Sub-species | 10 | 7 | 70 | 3 | 30 |
| Pteridophyte | | | | | |
| Families | 3 | | | 3 | 100 |
| Genera | 7 | | | 7 | 100 |
| Species | 11 | | | 11 | 100 |
| Thallophytic | | | | | |
| Families | 30 | | | 30 | 100 |
| Genera | 57 | | | 57 | 100 |
| Species | 108 | | | 108 | 100 |
| Gymnosperms | | | | | |
| Families | 2 | | | 2 | 100 |
| Genera | 2 | | | 2 | 100 |
| Species | 2 | | | 2 | 100 |

* Imported food plants are excluded, +National Seed Committee.

Source: Ministry of Forests and Soil Conservation (Nepal Biodiversity Strategy, 2002).

Table 7.7 : Number of CFUGs and Area by Development Region

| Area | No of CFUGs | Area (sq km) |
|---------------------------|---------------|------------------|
| Development Region | | |
| Eastern | 2649 | 330966 |
| Central | 3331 | 257814 |
| Western | 3807 | 180369 |
| Mid Western | 2594 | 288142 |
| Far Western | 1956 | 161982 |
| Total | 14,337 | 1,219,273 |

Source: Department of Forests, 2002.

Table 7.8 : Vegetation Area by Type and Household Involvement

| Vegetation type | CF Area (Ha)* | % of CF Area | No. of HHs | % HHs |
|-------------------------------|----------------------|---------------------|-------------------|--------------|
| Forests | 445,607.96 | 58.20 | 538,215 | 48.74 |
| Forest/Shrub | 84,477.73 | 11.03 | 79,060 | 7.16 |
| Shrub | 79,545.91 | 10.39 | 140,734 | 12.74 |
| Forest/Plantation | 39,257.62 | 5.13 | 77,360 | 7.01 |
| Not Specified | 23,898.78 | 3.12 | 32,005 | 2.9 |
| Shrub/Plantation | 22,162.36 | 2.89 | 51,444 | 4.66 |
| Plantation | 18,604.30 | 2.43 | 107,752 | 9.76 |
| Forest/Grass | 15,159.51 | 1.98 | 18,487 | 1.67 |
| Forest/Shrub/Plantation | 8,302.06 | 1.08 | 12,501 | 1.13 |
| Forest/Shrub/Grass | 7,098.28 | 0.93 | 5,935 | 0.54 |
| Shrub/Grass | 6,410.42 | 0.84 | 10,695 | 0.97 |
| Forest/Shrub/Plantation/Grass | 5,206.66 | 0.68 | 5,813 | 0.53 |
| Plantation/Grass | 3,575.19 | 0.47 | 10,084 | 0.91 |
| Shrub/Plantation/Grass | 3,526.25 | 0.46 | 6,721 | 0.61 |
| Forest/Plantation/Grass | 1,581.79 | 0.21 | 2,268 | 0.21 |
| Grass | 1,192.01 | 0.16 | 5,228 | 0.47 |

* Note : Households involve in one or more vegetation; CF = Community Forest

Source : Ministry of Forests and Soil Conservation (Nepal Biodiversity Strategy, 2002).

Table 7.9 : Number and Status of Nepal's Fauna

| Legend and Summary | Mammal | | Bird | | Herpeto | | Fish | |
|---|--------|-------|--------|-----|---------|-----|--------|-----|
| | Number | % | Number | % | Number | % | Number | % |
| Total Number of Species | 185 | 100 | 874 | 100 | 195 | 100 | 185 | 100 |
| Protected under NPWC Act, 1973 | 26 | 14.05 | 9 | 1 | 4 | 2 | | |
| CITES (Total) | 66 | 35.68 | 128 | 15 | 24 | 12 | | |
| Appendix-I | 28 | 15 | 16 | 2 | 8 | 4 | | |
| Appendix-II | 14 | 8 | 95 | 11 | 13 | 7 | | |
| appendix III | 24 | 13 | 17 | 2 | 3 | 2 | | |
| IUCN = IUCN Red List Category (Total) | 185 | 100 | 874 | 100 | 64 | 33 | | |
| Extinct (EX) | | | | | | | | |
| Extinct in the World (EW) | | | | | | | | |
| Critically Endangered (CR) | 1 | 1 | 3 | 0 | 1 | 1 | | |
| Endangered (EN) | 11 | 6 | 6 | 1 | 3 | 2 | | |
| Vulnerable (VU) | 21 | 11 | 26 | 3 | 7 | 4 | | |
| Near Threatened (NT) | 21 | 11 | 26 | 3 | 4 | 2 | | |
| Least Concern (LC) | 130 | 70 | 813 | 93 | 39 | 20 | | |
| Data Deficient (DD) | 1 | 1 | | | 10 | 5 | | |
| Not Evaluated (NE) | | | | | | | | |
| NRDB (Nepal Red Data Book) Status (Total) | 59 | 32 | 313 | 36 | 35 | 18 | 35 | 19 |
| Extinct Nepal (EXN) | 4 | 2 | 7 | 1 | | | | |
| Critically Endangered (C) | 5 | 3 | 6 | 1 | | | | |
| Endangered (E) | 11 | 6 | 53 | 6 | 1 | 1 | 1 | 1 |
| Vulnerable (V) | 16 | 9 | 112 | 13 | 6 | 3 | 10 | 5 |
| Susceptible (S) | 23 | 12 | 101 | 12 | 28 | 14 | 23 | 12 |
| Introduced (I) | | | | | | | 1 | 1 |
| Under Recorded (BPP) (UR) | | | 34 | 4 | | | | |

Source: Ministry of Environment, Science and Technology and International Center for Integrated Mountain Development (Biodiversity Profile Nepal, 1996 and Nepal Biodiversity Resource Book, 2007).

Table 7.10 : Aquatic Animals (Macro Invertebrates) of Nepal

| Group of Aquatic Animals | Total Number of Species | |
|--------------------------|-------------------------|-------|
| | Kathmandu Valley | Nepal |
| Coleoptera | 15 | 181 |
| Dipteral | 55 | 202 |
| Ephemeroptera | 33 | 29 |
| Megaloptera | 1 | NK |
| Odonate | 5 | 202 |
| Oligochaeta | 5 | NK |
| Trichoptera | 14 | 59 |
| Gastropoda | 7 | NK |
| Heteroptera | 7 | NK |
| Plecoptera | 9 | 67 |
| Hiridinia | 2 | NK |

NK= not known

Source: Pradhan and Sharma, 1998.

Table 7.11 : Number of Insect Species by Type

| Number of Insect Species | Total Number of Species Reported (World) | Number of Genera (World) | Number of Species (Nepal) |
|--|--|--------------------------|---------------------------|
| <i>Protura</i> | 4 | 0 | 3 |
| <i>Colembola</i> (Spring tails and snow flees) | 125 | 2 | 56 |
| <i>Thysanoptera</i> (Trips) | 25 | 0 | 6 |
| <i>Plecoptera</i> (Stoneflies) | 4 | 0 | 3 |
| <i>Molophaga</i> (Biting lice) | 10 | 0 | 0 |
| <i>Scepter</i> (Book lice and allies) | 31 | 0 | 15 |
| <i>Ephemeroptera</i> (May flies and allies) | 26 | 0 | 12 |
| <i>Neuropteran</i> (Alder flies and allies) | 29 | 1 | 21 |
| <i>Isopteran</i> (White ants or Termites) | 5 | 0 | 0 |
| <i>Trichoptera</i> (Caddis flies and allies) | 2 | 0 | 2 |
| <i>Siphunculata</i> | 1 | 0 | 0 |
| <i>Siphonoptera</i> (Fleas) | 37 | 1 | 13 |
| <i>Phasmida</i> (Stick ands leaf insects) | 2 | 0 | 0 |
| <i>Dermaptera</i> (Ear wigs) | 49 | 0 | 13 |
| <i>Orthoptera</i> (Crickets and grasshoppers) | 31 | 1 | 9 |
| <i>Dictyoptera</i> (Cockroaches and mountids) | 8 | 1 | 2 |
| <i>Odonata</i> (Dragon and damsel flies) | 147 | 1 | 2 |
| <i>Lepidoptera Butterflies</i> | 656 | 1 | 11 |
| <i>Lepidoptera Moths</i> | 789 | 8 | 11 |
| <i>Hemiptera</i> (Bugs) | 499 | 16 | 120 |
| <i>Hymenoptera</i> (Bees and wasps) | 174 | 0 | 13 |
| <i>Coleoptera</i> (Beetles and approx) | 1489 | 23 | 630 |
| <i>Diptera</i> (True flies) | 909 | 6 | 267 |

Source: The World Conservation Union , Nepal. (Thapa, V. K., 1977 and An Inventory of Nepal's Insects, Vol. 1).

Table 7.12 : Threatened Species in the SAARC Member Countries (Taxonomic Group)

| Species | Bangladesh | Bhutan | India | Maldives | Nepal | Pakistan | Sri Lanka |
|---------------------|------------|-----------|------------|-----------|-----------|----------|------------|
| Mammals | 22 | 21 | 85 | 0 | 29 | 23 | 21 |
| Birds | 23 | 18 | 79 | 2 | 31 | NA | 16 |
| Reptiles | 20 | 0 | 25 | 2 | 6 | NA | 8 |
| Amphibians | 0 | 1 | 66 | 0 | 3 | NA | 44 |
| Fishes | 8 | 0 | 28 | 8 | 0 | NA | 23 |
| Molluscas | 0 | 0 | 2 | 0 | 0 | NA | 0 |
| Other Invertebrates | 0 | 1 | 21 | 0 | 1 | NA | 2 |
| Plants | 12 | 7 | 246 | 0 | 7 | - | 280 |
| Total | 85 | 48 | 552 | 12 | 77 | | 394 |

Source : Asian Development Bank (Environment Key Indicator 2001)

Table 7.13 : Protected Floral Species of Nepal

| S.N. | Scientific Name | English Name | Local Name | Potential Use |
|---|--|------------------|---------------|---------------|
| Banned for collection, transportation and trade | | | | |
| 1 | <i>Dactylorhiza hatagirea</i> | Orchid | Panchaunle | Tonic |
| 2 | <i>Parkia roxburghii</i> | Walnut | Okharko bokra | Medicine |
| 3 | <i>Neopicrorhiza scrophulariifolia</i> | Gentian | Kutki | Medicine |
| Banned for export outside the country without processing | | | | |
| 1 | <i>Nardostachys grandiflora</i> | Spikenard | Jatamansi | Medicine |
| 2 | <i>Rauvolfia serpentina</i> | Rauwolf | Sarpagandha | Medicine |
| 3 | <i>Cinnamomum glaucescens</i> | | Sugandakokila | |
| 4 | <i>Valeriana jatamansi</i> | Valerian | Sugandhawal | Medicine |
| 5 | <i>Lichens</i> | Lichen | Jhyaau | |
| 6 | <i>Abies spectabilis</i> | | Talispatra | Medicine |
| 7 | <i>Taxus baccata subsp</i> | Himalayan yew | Lauth salla | Medicine |
| Banned for felling, transportation and export | | | | |
| 1 | <i>Shorea robusta</i> | Common sal | Saal | Timber |
| 2 | <i>Dalbergia latifolia</i> | Rose Wood | Satisaal | Timber |
| 3 | <i>Pterocarpus marsupium</i> | Indian Kino tree | Bijayasal | Timber |
| 4 | <i>Juglans regia</i> | Walnut | Okhar | Timber |

Source: Department of Plant Resources (Nepal Gazette).

Table 7.14 : Endemic Fishes of Nepal

| S.N. | Scientific Name | Local Name |
|-------------|-------------------------------------|-------------------|
| 1 | <i>Acrossocheilus hexadonolepis</i> | Katla |
| 2 | <i>Chagunius chagunio</i> | Rahu |
| 3 | <i>Tor putitora</i> | Mahaseer |
| 4 | <i>Tor tor</i> | Sahar |
| 5 | <i>Danio rerio</i> | Zebra macha |
| 6 | <i>Schizothorax</i> | Chuche Asala |
| 7 | <i>Schizothorax plagiostomus</i> | Buche Asala |
| 8 | <i>Schizothorax richardsonii</i> | Asala |
| 9 | <i>Psilorhynchus pseudecheneis</i> | Tite Macha |
| 10 | <i>Anguilla bengalensis</i> | Rajabam |

Source: Ministry of Forests and Soil Conservation (Nepal Biodiversity Strategy, 2002).

Table 7.15 : Protected Faunal Species included in the National Parks and Wildlife Conservation Act, 1973

| S.N. | Scientific Name | Local Name | English Name | Status | |
|----------|---------------------------------|---------------------|-----------------------------|--------|----------------|
| | | | | IUCN | CITES Appendix |
| Mammals | | | | | |
| 1 | <i>Sus salvanius</i> | Sano bandel | Pigmy hog | Ex | I |
| 2 | <i>Ailurus cervicapra</i> | Habrey | Red panda | | I |
| 3 | <i>Antilope cervicapra</i> | Krishnasar | Black buck | V | III Nep |
| 4 | <i>Bos gaurus</i> | Gauri gai | Gaur bison | V | I |
| 5 | <i>Bos mutus</i> | Yak nak | Wild yak | E | I |
| 6 | <i>Bubalus arnee</i> | Arna | Wild water buffalo | E | III Nep |
| 7 | <i>Canis lupus</i> | Bwanso | Gray wolf | V | I |
| 8 | <i>Caprotgus hispidus</i> | Hispid Kharayo | Hispid hare | E | I |
| 9 | <i>Cervus duvauceli</i> | Barasinghe | Swamp deer | E | I |
| 10 | <i>Elephas maximus</i> | Hatti | Asiatic elephant | E | I |
| 11 | <i>Felis lynx</i> | Banbiralo | Lynx | E | II |
| 12 | <i>Hyanena hyaena</i> | Hundar | Striped hyena | E | |
| 13 | <i>Macaca assamensis</i> | Asamese rato bander | Asamese monkey | | II |
| 14 | <i>Manis crassicaudata</i> | Salak | Indian pangolin | | II |
| 15 | <i>Manis pentadactyla</i> | Salak | Chinese pangolin | | II |
| 16 | <i>Moschus chrysogaster</i> | Kasturi mriga | Himalayan forest, musk deer | E | I |
| 17 | <i>Ovis ammon</i> | Nayan | Great Tibetan sheep | I | I |
| 18 | <i>Panthera tigris</i> | Bagh | Bengal tiger | E | I |
| 19 | <i>Panthera uncia</i> | Hiunchituwa | Snow leopard | E | I |
| 20 | <i>Pontholops hodgsoni</i> | Chiru | Tibetan antelope | | I |
| 21 | <i>Neofelis nebulosa</i> | Dwanshe chituwa | Clouded leopard | V | I |
| 22 | <i>Platanista gangetica</i> | Souns | Geanetic dolphin | V | I |
| 23 | <i>Prionailurus bengolensis</i> | Chari bagh | Leopard cat | | II |
| 24 | <i>Prionodon pardicolor</i> | Silu | Spotted ling sang | | I |
| 25 | <i>Rhinoceros unicornis</i> | Gainda | One horned rhinoceros | E | I |
| 26 | <i>Tetrocerus quadricornis</i> | Chauk | Four-horned antelope | | III Nep |
| 27 | <i>Ursus arctos</i> | Himali rato bhalu | Brown bear | | I |
| Birds | | | | | |
| 1 | <i>Buceros bicornis</i> | Thulo dhanes | Great- pied hornbill | | I |
| 2 | <i>Catreus wallichii</i> | Cheer | Cheer pheasant | E | I |
| 3 | <i>Ciconia ciconia</i> | Seto stork (saras) | White stork | | II |
| 4 | <i>Ciconia nigra</i> | Kalo stork | Black stork | | II |
| 5 | <i>Grus grus</i> | Saras | Souse crane | | |
| 6 | <i>Eupodotisbengalensis</i> | Khar major | Bengal florican | E | I |
| 7 | <i>Lophophorus impejanus</i> | Danfe | Impedance pheasant | | I |
| 8 | <i>Sypheotides indica</i> | Sano khar major | Lesser florican | | III |
| 9 | <i>Tragopan satyra</i> | Munal | Crimson-horned pheasant | | III Nep |
| Reptiles | | | | | |
| 1 | <i>Gavialis gangeticus</i> | Ghadial gohi | Gharial | E | I |
| 2 | <i>Python molurus</i> | Azingar | Asiatic rock python | V | I |
| 3 | <i>Varanus flavescens</i> | Sun gohori | Golden monitor lizard | I | I |

Note: Common name pangolin refers for two main species, as suggested by Bio-diversity Profile Project, 1995.

I = Indeterminate, E = endangered, V = vulnerable, Ex= extinct

Source: Ministry of Population and Environment (State of the Environment, Nepal, 2001) and Department of National park and Wildlife Conservation, 2001/02.

Table 7.16 : Protected Area in Different Physiographic Zones

| National Parks, Wildlife and Conservation Area | Year of Declaration | Area (in sq. km) | Physiographic Zone | Conservation Focus |
|---|----------------------------|-------------------------|---------------------------|--|
| A) National Parks | | | | |
| Chitwan National Park (World Heritage Site 1984) | 1973 | 932 | Tarai / Siwalik | Rhino , elephant, tiger , bison etc |
| Langtang National Park | 1976 | 1710 | High Mountain | Musk, deer, and red panda |
| Rara National Park | 1976 | 106 | High Mountain | Musk, deer, red panda and high altitude lake |
| Sagarmatha National Park (World Heritage Site 1979) | 1976 | 1148 | High Mountain | Musk, deer, red panda, bear and snow leopard |
| She-Phoksundo National Park | 1984 | 3555 | High Mountain | Wild goat, blue sheep, musk deer, lake |
| Khaptad National Park | 1984 | 225 | Middle Mountain | Wild goat, blue sheep, spiritual site |
| Bardia National Park | 1976 & 1988 | 968 | Tarai | Rhino, elephant, tiger, etc |
| Makalu Barun National Park | 1991 | 1500 | High Mountain | High altitude, endangered plants |
| Shivapuri National Park (Rename 2002) | 1984 | 144 | Mid hills | Conservation of capital city |
| Total | | 10288 | | |
| B) Wildlife Reserves | | | | |
| Shuklaphanta | 1976 | 305 | Tarai | Swamp, deer, rhino, tiger etc |
| Koshi Tappu (Ramsar Site 1987) | 1976 | 175 | Tarai | Wild buffalo and migratory birds |
| Parsa | 1984 | 499 | Tarai / Siwalik | Tiger, deer, antelopes, bison etc |
| Total | | 979 | | |
| C) Hunting Reserve | | | | |
| Dhorpatan Hunting Reserve | 1987 | 1325 | Middle Mountain | Blue sheep |
| Total | | 1325 | | |
| D) Conservation Area | | | | |
| Annapurna | 1992 | 7629 | Middle Mountain | endemic plants and mountain |
| Kanchanjunga | 1997 | 2035 | Middle Mountain | endemic plants and mountain |
| Manasalu | 1998 | 1663 | High Mountain | endemic plants and mountain |
| Total | | 11327 | | |

Source : Ministry of Forests, Soil Conservation, 2006 (Third national Report) to CBD.

Table 7.17 : Number of Districts and VDCs with Buffer Zone

| Buffer zones | Districts | VDCs | Declared Year | Area (sq. km) |
|-------------------------------|------------------|-------------|----------------------|----------------------|
| Chitwan National Park | 4 | 37 | 1996 | 750.0 |
| Bardia National Park | 3 | 17 | 1996 | 328.0 |
| Langtang National Park | 3 | 34 | 1998 | 420.0 |
| Sheyphoksundo National Park | 2 | 11 | 1998 | 1349.0 |
| Makalu Barun National Park | 2 | 12 | 1999 | 830.0 |
| Sagarmatha National Park | 1 | 3 | 2002 | 275.0 |
| Koshi Tappu Wildlife Reserve | 3 | 16 | 2004 | 173.0 |
| Shuklaphanta Wildlife Reserve | 1 | 12 | 2004 | 243.5 |
| Parsa Wildlife Reserve | 3 | 10 | 2005 | 298.2 |
| Rara National Park | 2 | 9 | 2006 | 198.0 |
| Kanchanjunga National Park | 4 | 21 | 2006 | 216.0 |
| Khaptad National Park | 4 | | 1996 | 216.0 |
| Total | 32 | 182 | | 5296.7 |

Source : Department of National Park and Wildlife Conservation (Nepal Biodiversity Strategy, 2002).

Table 7.18 : Biodiversity in Protected Areas, Ramsar and Heritage Sites in Nepal

| Protected Area | BPN Estimates | NBY Records | % of NBY/BPN | Number of Vascular Plant Species | Mammal | | Bird | | Herpeto | | Fish | |
|--------------------------------|---------------|-------------|--------------|----------------------------------|--------|------------|--------|------------|---------|------------|--------|------------|
| | | | | | Number | Total % of | Number | Total % of | Number | Total % of | Number | Total % of |
| National Parks | | | | | | | | | | | | |
| Chitwan | 919 | 227 | 25 | 234 | 58 | 31 | 539 | 62 | 56 | 29 | 124 | 66 |
| Langtang | 3689 | 976 | 26 | 1043 | 45 | 24 | 345 | 39 | 4 | 2 | 2 | 1 |
| Rara | 1070 | 88 | 8 | 88 | 51 | 28 | 241 | 28 | 2 | 1 | 3 | 2 |
| Sagarmatha | 1074 | 160 | 15 | 160 | 33 | 18 | 208 | 24 | 5 | 3 | 1 | 1 |
| She-Phoksundo | 1579 | 174 | 11 | 174 | 35 | 19 | 208 | 24 | 3 | 2 | | |
| Khaptad | 567 | 289 | 51 | 295 | 23 | 12 | 287 | 33 | 23 | 12 | | |
| Bardia | 839 | 167 | 20 | 173 | 59 | 32 | 407 | 47 | 42 | 22 | 124 | 66 |
| Makalu Barun | 3073 | 280 | 9 | 284 | 81 | 44 | 421 | 48 | 14 | 7 | 13 | 7 |
| Shivapuri | 2122 | 449 | 21 | 449 | 19 | 10 | 311 | 36 | 3 | 2 | | |
| Wildlife Reserves | | | | | | | | | | | | |
| Shuklaphanta | 202 | 535 | 265 | 553 | 46 | 25 | 351 | 40 | 7 | 4 | 28 | 15 |
| Koshi Tappu | 237 | 154 | 65 | 158 | 23 | 12 | 485 | 55 | 17 | 9 | 105 | 56 |
| Parsa | 919 | 293 | 32 | 298 | 37 | 20 | 503 | 58 | 8 | 4 | 8 | 4 |
| Hunting Reserve | | | | | | | | | | | | |
| Dhorpatan | 1150 | 58 | 5 | 58 | 18 | 10 | 137 | 16 | 2 | 1 | 0 | 0 |
| Conservation Area | | | | | | | | | | | | |
| Manasalu | | | | 587 | 21 | 11 | 193 | 22 | | | | |
| Annapurna | 3430 | 451 | 13 | 456 | 97 | 52 | 476 | 54 | 56 | 29 | 2 | 1 |
| Kanchanjunga | | | | 77 | 13 | 7 | 280 | 32 | | | | |
| Selected Ramsar Sites | | | | | | | | | | | | |
| Ghodaghodi Tal | | | | 388 | 34 | 18 | 96 | 11 | 9 | 5 | 23 | 12 |
| Jagdishpur Reservoir | | | | 16 | 6 | 3 | 45 | 5 | 9 | 5 | 18 | 10 |
| Beeshazar and associated Lakes | | | | 37 | 26 | 14 | 271 | 31 | 18 | 9 | 25 | 13 |
| World Heritages | | | | | | | | | | | | |
| Pashupatinath | | | | 74 | 9 | 5 | 63 | 7 | | | | |
| Swayambhunath | | | | 109 | 6 | 3 | 64 | 7 | | | | |
| Changunarayan | | | | 21 | 7 | 4 | 51 | 6 | | | | |
| Lumbini | | | | 72 | 26 | 14 | 207 | 24 | 39 | 20 | 44 | 24 |

BPN= Biodiversity Profile in Nepal, NBY = Nepal Biodiversity Year Book.

Source: Ministry of Forests and Soil Conservation (Nepal Biodiversity Record Book, 2006) , and Department of National Park and Wildlife Conservation, 2000.

Table 7.19 : Increase in Total Number of Faunal Species

| Year | Mammal | Bird | Herpeto | Fish | Butterfly | Moth | Spider |
|---------------------------------------|--------|------|---------|------|-----------|------|--------|
| Biodiversity Profile in Nepal 1996 | 181 | 843 | 143 | 185 | 643 | - | 144 |
| Nepal Biodiversity Record Book - 2006 | 185 | 874 | 195 | 187 | 651 | 789 | 175 |

Source: Ministry of Forests and Soil Conservation (Nepal biodiversity record book 2006 and Biodiversity Profile in Nepal 1996).

Table 7.20 : Consumption of Petroleum Products

Unit : KL

| Description | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08# |
|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Petrol | 59245 | 63271 | 67457 | 67586 | 75989 | 80989 | 101911 | 66572 |
| High Speed Diesel | 326060 | 286233 | 299973 | 299730 | 315368 | 294329 | 306687 | 197789 |
| Kerosene Oil | 316381 | 386593 | 348683 | 310826 | 239328 | 226637 | 197849 | 107751 |
| Llight Diesel Oil | 3418 | 2413 | 610 | 577 | 100 | 290 | - | - |
| Furnace Oil | 20999 | 18255 | 14502 | 12653 | 2639 | 3695 | 4557 | 2224 |
| Aircraft Turbine Oil | 63130 | 47453 | 52839 | 64041 | 66825 | 64335 | 63777 | 46081 |
| L.P. Gas | 40102 | 48757 | 56079 | 66142 | 77594 | 81005 | 93562 | 62964 |
| Total | 829,335 | 853,095 | 840,143 | 821,555 | 777,843 | 751,280 | 768,343 | 483,381 |

provisional

Source: Nepal Oil Corporation, 2008.

Table 7.21 : Nepalese World Heritage Sites

| S. N. | Nepalese Heritages | Place of Establishment | Existed Year |
|-------|----------------------------|------------------------|------------------------|
| 1 | Hanumandhoka Durbar Square | Kathmandu | 613 A.D (B.S. 670) |
| 2 | Patan Darbar Square | Lalitpur | 1565 A.D (B.S. 1622) |
| 3 | Bhaktapur Darbar Square | Bhaktapur | 1427 A.D (B.S. 1484) |
| 4 | Pashupatinath Temple | Kathmandu | 5th Century |
| 5 | Swayambhunath Stupa | Kathmandu | 5th Century |
| 6 | Bouddhanath Stupa | Kathmandu | 5th Century |
| 7 | Changunarayan Temple | Bhaktapur | 306 A.D (B.S. 363) |
| 8 | Chitwan National Park | Chitwan | 1974 A.D (B.S. 2030) |
| 9 | Sagarmatha National Park | Solukhumbhu | 1976 A.D (B.S. 2032) |
| 10 | Lumbini | Rupandehi | 1997 A.D |

Source: Department of Information, Nepal, April-May, 2002.

Table 7.22 : Yearly Energy Use by Sector

('000 TOE)

| Energy Consumption | Year | | | | | | | | | | | | |
|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 50/51 | 51/52 | 52/53 | 53/54 | 54/55 | 55/56 | 56/57 | 57/58 | 58/59 | 59/60 | 60/61 | 61/62 | 62/63 |
| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Residential | 5980 | 6123 | 6278 | 6437 | 6606 | 6754 | 6926 | 7066 | 7383 | 7515 | 7657 | 7784 | 8036 |
| Industrial | 217 | 260 | 276 | 151 | 162 | 177 | 369 | 305 | 294 | 281 | 322 | 299 | 305 |
| Commercial | 52 | 60 | 67 | 75 | 69 | 75 | 87 | 97 | 116 | 96 | 125 | 125 | 134 |
| Transport | 157 | 184 | 205 | 280 | 318 | 348 | 300 | 319 | 282 | 325 | 308 | 326 | 338 |
| Agriculture | 13 | 15 | 16 | 23 | 26 | 17 | 70 | 74 | 65 | 68 | 68 | 72 | 77 |
| Others | 5 | 6 | 6 | 7 | 8 | 8 | 8 | 10 | 11 | 11 | 13 | 15 | 15 |
| Total | 6423 | 6648 | 6848 | 6972 | 7188 | 7379 | 7760 | 7871 | 8151 | 8296 | 8492 | 8621 | 8905 |

Source: Water and Energy Commission Secretariat.

Table 7.23 : Yearly Energy Supply (Production and Consumption) by Sector and Type

('000 TOE)

| Fuel Supply by Type | Year | | | | | | | | | | | | | |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 51/52 | 52/53 | 53/54 | 54/55 | 55/56 | 56/57 | 57/58 | 58/59 | 59/60 | 60/61 | 61/62 | 62/63 | 63/64 | 64/65* |
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2006/07 | 2007/08 |
| Traditional | 6059 | 6185 | 6268 | 6403 | 6540 | 6681 | 6824 | 7088 | 7241 | 7397 | 7558 | 7721 | 6037 | 5560 |
| Fuel wood | 5412 | 5525 | 5574 | 5694 | 5816 | 5941 | 6068 | 6315 | 6451 | 6590 | 6733 | 6878 | 5187 | 4910 |
| Agri. residue | 243 | 248 | 273 | 279 | 285 | 292 | 299 | 306 | 313 | 320 | 328 | 336 | 349 | 268 |
| Animal dung | 404 | 412 | 421 | 430 | 439 | 448 | 457 | 467 | 477 | 487 | 497 | 507 | 501 | 382 |
| Commercial | 582 | 650 | 692 | 824 | 818 | 1054 | 1017 | 1029 | 1018 | 1053 | 1016 | 1133 | 1072 | 943 |
| Petroleum | 449 | 506 | 555 | 680 | 661 | 709 | 734 | 758 | 754.5 | 741.5 | 707.1 | 724 | 706 | 643 |
| LPG | 15 | 21 | 25 | 27 | 29 | 35 | 46 | 56 | 65 | 77 | 90 | 103 | | |
| Motor spirit | 27 | 32 | 35 | 37 | 39 | 44 | 47 | 50 | 53 | 53 | 59 | 62 | | |
| Air turbine fuel | 32 | 34 | 41 | 44 | 47 | 48 | 54 | 40 | 45 | 54 | 57 | 64 | | |
| Kerosene | 154 | 178 | 207 | 294 | 251 | 282 | 269 | 329 | 297 | 264 | 203 | 198 | | |
| High speed Diesel | 202 | 223 | 230 | 268 | 281 | 276 | 290 | 255 | 267 | 267 | 279 | 276 | | |
| Light diesel oil | 3 | 4 | 2 | 1 | 1 | 4 | 3 | 2 | 0.5 | 0.5 | 0.08 | 0.09 | | |
| Fuel oil | 10 | 8 | 8 | 1 | 4 | 10 | 14 | 14 | 13 | 10 | 1 | 1 | | |
| Others | 6 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 16 | 18 | 20 | | |
| Coal | 67 | 72 | 60 | 61 | 68 | 246 | 175 | 152 | 134 | 172 | 152 | 241 | 172 | 166 |
| Electricity | 66 | 72 | 77 | 83 | 89 | 99 | 108 | 119 | 129 | 139 | 157 | 168 | 194 | 134 |
| Renewable (others) | 7.5 | 10.5 | 13.6 | 16.6 | 19.7 | 23.8 | 28.9 | 34 | 39 | 42 | 46.6 | 50.4 | 51 | 40 |
| Biogas | 7 | 10 | 13 | 16 | 19 | 23 | 28 | 33 | 38 | 41 | 45 | 49 | | |
| Micro-hydro | 0.5 | 0.54 | 0.58 | 0.64 | 0.7 | 0.79 | 0.89 | 0.94 | 1.02 | 1 | 1.16 | 1.24 | | |
| Solar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 | 0.01 | 0.03 | 0.45 | 0.17 | | |
| Total | 6649 | 6846 | 6974 | 7244 | 7378 | 7759 | 7870 | 8151 | 8298 | 8492 | 8621 | 8905 | 7160 | 6543 |

* Estimate of first eight months.

Source: Water and Energy Commission Secretariat

Chapter VIII

Waste Management

Table 8.1 : Solid Waste Generation and Disposal Cost of Municipalities

| Municipality | Quantity (mt.) per Day | | | | Cost (Rs/day)* | | | |
|-------------------------------|-------------------------|---------|---------|---------|-----------------|---------|---------|---------|
| | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2003/04 | 2004/05 | 2005/06 | 2006/07 |
| Amargadhi | 0.5 | 0.7 | 1.25 | | NA | NA | 1370 | |
| Byas | NA | 4.8 | 7 | 6 | NA | 1760 | 2460 | 4280.08 |
| Baglung | 2 | 4 | 4 | 4 | NA | 2262 | 2735 | 3779.12 |
| Banepa | 4 | 4.5 | 4.5 | 4.52055 | 16133 | 4521 | 11206 | 12295.9 |
| Bhadrapur | 2.5 | 2.5 | 1 | 0.9863 | 3000 | 3000 | 2953 | 2491.04 |
| Bhaktapur | 2 | 2 | 2.2 | 4.8 | 18748 | 18748 | 44000 | 57194.7 |
| Bharatpur | 1.2 | 1.2 | 1 | NA | 2000 | 10444 | NA | 6779.85 |
| Bhimeswor | 4 | 3 | 1.5 | | 6670 | 800 | 379 | 958.904 |
| Bidur | 4 | 4 | 5 | 4 | 1000 | 1000 | 1740 | 3248 |
| Biratnagar Sub-met City | 39.55 | 39.55 | 21 | | 2739 | 2739 | 27789 | 17983.6 |
| Birendranagar | 1.2 | 1.2 | 1.5 | 0.5 | 2062 | 2191 | 560 | 3701.63 |
| Birganj Sub Metropolitan City | 8.5 | 35 | 35 | 41.0959 | 500 | 73150 | 1000 | 629315 |
| Butawal | 18 | 18 | NA | 12.5 | 4725 | 15068 | NA | 21917.8 |
| Damak | 4 | 5 | 4.25 | 4 | 2000 | 1918 | 1643 | 1923.73 |
| Dasharathchanda | 2 | 2 | 1 | 0.0274 | 2200 | 2200 | 548 | 584.658 |
| Dhangadhi | 1 | 1.6 | 1.1 | | 22010 | 690 | 6000 | 7123.29 |
| Dhankuta | 0.321 | 0.7 | NA | | 1111 | 1470 | NA | |
| Dharan | 7 | 7 | 3 | 4.65753 | 4000 | 4000 | 10958 | 10369.9 |
| Dhulikhel | 4 | 3 | 5 | 1.8411 | 5533 | 1644 | 1849 | 1353.42 |
| Dipayal/Silgadhi | NA | 0.01 | NA | 1 | NA | 438 | 443 | 1232.88 |
| Guleriya | 6 | 6 | 3 | 1.55342 | 700 | 700 | 1500 | 1323.29 |
| Gaur | NA | 1.5 | 7 | 0.44137 | NA | 2824 | 2000 | 4109.59 |
| Hetauda | NA | 10 | NA | | NA | 10958 | NA | |
| Ilam | 2 | 2 | 6 | | 40720 | 40720 | 500 | |
| Inaruwa | 0.2 | 0.2 | 0.2 | 2 | 9040 | 9040 | 1600 | 1383.86 |
| Itahari | 16.8 | 16.8 | 9 | 22.5 | NA | NA | 30137 | 4657.53 |
| Jaleswor | 5 | 3 | 5 | | 3123 | 2909 | NA | 3512.33 |
| Janakpur | 5 | 5 | 1.5 | 11.1507 | NA | 11501 | 11501 | 15213.4 |
| Kapilbastu | 0.5 | 4 | NA | 2 | 40720 | 1726 | NA | 2739.73 |
| Kalैया | NA | 0.011 | 1.5 | 1.2 | 1.5 | 4730 | 4667 | 547.945 |
| Kathmandu Metropolitan City | 29.9 | 29.9 | 30.6 | 30.6 | 9040 | 16838 | 16938 | 16938 |
| Kamalamai | NA | 5 | 3.5 | 2 | 3.5 | 505 | 821 | 609.608 |
| Khadbari | NA | 0.01 | NA | | NA | 1000 | NA | |
| Kirtipur | 1.25 | 1.226 | 1.226 | 1.22 | NA | 9377 | 257 | NA |
| Lekhnath | NA | NA | NA | NA | NA | NA | NA | NA |
| Lahan | 0.5 | 0.4 | 0.4 | 0.05479 | 3123 | 2269 | 6690 | 4109.59 |
| Lalitpur Sub Met. City | 13 | 15 | 15 | 7.5 | 16434 | 15635 | 68493 | 82191.8 |
| Madhyapur Thimi | 13.6 | 14 | 9 | 0.04932 | 280 | 1507 | 3192 | 4109.59 |
| Mahendranagar | 8.8 | 9 | 3.5 | 3.24658 | 10500 | 1096 | 2142 | 5479.45 |
| Malangawa | 0.8 | 1 | 2 | 1.69863 | 1025 | 2100 | NA | 1616.44 |
| Mechinagar | 5 | 4.5 | 6 | 4.5 | 900 | 2055 | 1863 | 1364.73 |
| Narayan | 0.25 | 0.25 | NA | 0.45 | 300 | 300 | NA | 986.301 |
| Nepalgunj | 15.8 | 15.9 | 18 | 4.59178 | 46767 | 16358 | 20821 | 8480.73 |
| Panaudi | NA | 1 | 1 | 0.07688 | NA | 1500 | 1750 | 1145.21 |
| Pokhara Sub Met. City | 23.8 | 25 | 47 | 47.3909 | NA | NA | 40066 | 36156.2 |
| Prithbinarayan | 2.5 | 2.5 | 2 | 0.4 | 605 | 930 | 1200 | 612.852 |
| Putalibazar | 1 | 0.4 | .13 | 1.2274 | 1527 | 1125 | 1500 | 2191.78 |
| Rajbiraj | 0.4 | 0.4 | 0.2 | 0.9863 | 300 | 300 | 3100 | 1643.84 |
| Ramgram | 1 | 2 | NA | 1.5 | 1964 | 766 | NA | 1211.75 |
| Ratnanagar | 10 | 5 | NA | 4 | 900 | 1247 | NA | 2410.96 |
| Siraha | NA | 0.1 | 0.1 | 0.05479 | NA | 684 | 1457 | |
| Siddharthanagar | 5 | 5 | NA | 14 | 800 | 800 | NA | 9120.55 |
| Tansen | 8 | 8 | 9.5 | 2.6 | 4500 | 4500 | 5480 | 5205.48 |
| Tikapur | 0.28 | 4 | 0.5 | 0.49315 | 1233 | 338 | 1100 | 345.205 |
| Tribhuvan Nagar | 10 | 6 | 1.578 | 0.79025 | 632 | 3780 | 5931 | 7684.39 |
| Triyuga | 0 | 0.01 | NA | 0.13973 | 422 | 450 | NA | 753.425 |
| Tulsipur | 6.5 | 4.43 | 0.6 | 0.19178 | 1650 | 2024 | 2502 | 3013.7 |
| Waling | 7 | 1 | .70 | 0.9863 | 1000 | 421 | 700 | 668.825 |

*cost is based on the annual budget of waste management of municipalities.

Source: Municipalities.

Table 8.2 : Daily Solid Waste Generation in Kathmandu Metropolitan City

| Waste Generation | Unit | Year | | | |
|---|---------------------|------|------|------|------|
| | | 2000 | 2001 | 2002 | 2003 |
| Domestic Liquid Waste Generation | l/d/p | 1 | 1 | 1 | 1 |
| Total Domestic Waste Generation | m ³ /day | 700 | 725 | 730 | 750 |
| Street Waste Generation (Assumed 10% of Domestic waste) | m ³ /day | 70 | 72.5 | 73 | 75 |
| Commercial Waste (Assumed 10 % of Domestic waste) | m ³ /day | 70 | 72.5 | 73 | 75 |
| Waste Generated from Neighboring Cities & VDC (Assumed 10% of Domestic Waste) | m ³ /day | 70 | 72.5 | 73 | 75 |
| Total waste Generation | m ³ /day | 911 | 944 | 949 | 975 |
| Average Waste Collected | m ³ /day | 784 | 647 | 651 | 895 |
| Collection Efficiency | % | 71 | 71 | 69 | 92 |

Source: Kathmandu Metropolitan City (Environment Management Division).

Table 8.3 : Daily Solid Waste Generation in Municipalities of Kathmandu Valley by Type of Waste

(in %)

| Description | Kirtipur | | | Kathmandu | | | Lalitpur | | | Bhaktapur | | | Thimi | | |
|-----------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|------------|------------|-------------|------------|------------|
| | 2000 | 2005 | 2006 | 2001* | 2005 | 2006 | 2004 | 2005 | 2006 | 2003 | 2005 | 2006 | 2003 | 2005 | 2006 |
| Organic | 74 | 75 | 74.2 | 69 | 69 | 69 | 67.5 | 67.5 | 67.5 | 70.2 | 75 | 75 | 70.1 | 75 | 75 |
| Paper | 3 | | 5.72 | 9 | 9 | 9 | 8.8 | | 8.8 | 2.37 | | 3.25 | 4.9 | | 6 |
| Rubber | 1 | | 0.09 | 1 | 1 | 1 | 0.3 | | 0.15 | 0.05 | | | 0.55 | | 1 |
| Leather | 2 | | 0.87 | N.A | | | | | 0.15 | | | | | | 1 |
| Wood | 0 | | 0.09 | 1 | | | 0.6 | | 0.6 | | | | | | |
| Plastic | 9 | 9 | 8.83 | 9 | 9 | 9 | 11.4 | 15.4 | 11.4 | 3.23 | 6.4 | 3.4 | 8.25 | 20 | 5 |
| Textile | 6 | | 1.92 | 3 | 3 | 3 | 3.6 | | 3.6 | 1.69 | 3 | 3 | 2.27 | | 1 |
| Ferrous Metal | | | 1.94 | 1 | 1 | 1 | 0.9 | | 0.9 | 0.07 | | 0.3 | 0.25 | | |
| Inert | | | | | | | | | | 21.1 | | | 12 | | |
| Glass | 1 | | 2.91 | 3 | 3 | 3 | 1.6 | | 1.3 | 1.33 | | 1.5 | 1.29 | | 2 |
| Others | 4 | 16 | 3.39 | 4 | 3 | 3 | 5.3 | 17.1 | 5.6 | 0.05 | 18.6 | 2.45 | 0.19 | 5 | 9 |
| Medical waste | | | | | | | | | | | | | 0.2 | | |
| Construction Material | | | | | 2 | 2 | | | | | | 11.1 | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Average Collection % | | | | | 91 | 91 | | | | 51.3 | | | 47.2 | | |

Source : Municipalities, *Kathmandu Metropolitan City (Environment Management Division).

Table 8.4 : Consumption and Scrap Generation of Lead Acid Batteries in Nepal

| Application | Estimated consumption | | Estimated scrap quantity | |
|--------------------------|-----------------------|------------------|--------------------------|------------------|
| | (Tons batteries) | | (Tons batteries) | |
| | 1998 | 2008 | 1998 | 2008 |
| Automobile sector | 1770 | | 1240 | 2075 |
| Traction sector, total | 155-190 | 800-1070 | 1-50 | 1-930 |
| -Electrical vehicles | 155-190 | 800-1070 | 0-50 | 0-930 |
| -Other purposes | 1 | 1 | 1 | 1 |
| Stationary sector, total | 80-95 | 225-320 | 20-30 | 110-190 |
| -Solar energy systems | 37-39 | 170-240 | 3-5 | 90-160 |
| -Other purposes | 41-56 | 56-81 | 16-26 | 21-31 |
| Total | 2005-2055 | 3535-3900 | 1260-1320 | 2185-3195 |

Source: Ministry of Population and Environment, 2001.

Table 8.5 : Amount of Date Expired Pesticides Stored at Different Warehouses

| SN | Location | Amount (in mt) | Remarks / Storage condition |
|----|-----------------|--------------------|---|
| 1 | AIC Amlekhganj | 50.900 | Packed in 200 liters steel drums and 60 liters HDPC |
| 2 | NSC, Nepalganj | 6.735 | Some packed in 60 liters HDPC and rest in bad condition |
| 3 | NARC, Khumaltar | 4.761 | Packed in 200 liters HDPC |
| 4 | AIC Biratnagar | 1.660 | Stored in thatched house, worst condition |
| 5 | SSD, Hetauda | 1.650 | Stored in rented room |
| 6 | RARS, Lumle | 1.625 | Dust spread over, bad condition |
| 7 | CDB, Khajura | 1.485 | Liquid spilled over, worst condition |
| 8 | AIC, Pokhara | 1.285 | Bags broken, OK |
| 9 | AIC, Birganj | 0.850 | Stored in small room |
| 10 | NSC, Janakpur | 0.813 | Dust spread over, bad condition |
| 11 | AIC, Surkhet | 0.442 | Deposited to NSC, Nepalganj |
| 12 | RARS, Khajura | 0.387 | OK |
| 13 | DADO, Banke | 0.370 | Stored in open garage, worst condition |
| 14 | AIC, Kuleswor | 0.214 | OK |
| 15 | AIC, Bharatpur | 0.181 | OK |
| 16 | NSC, Hetauda | 0.150 | OK |
| 17 | ARS, Pakhribas | 0.138 | OK |
| 18 | AIC, Ghorahi | 0.137 | |
| 19 | AIC, Sindhuli | 0.130 | |
| 20 | AIC, Gaighat | 0.110 | |
| 21 | AIC, Lahan | 0.090 | |
| 22 | AIC, Illam | 0.083 | |
| 23 | AIC, Lamahi | 0.502 | |

Table 8.5 : Amount of Date Expired Pesticides Stored at Different Warehouses (contd...)

| SN | Location | Amount (in mt) | Remarks / Storage condition |
|-------------|-----------------|---|---|
| 24 | DADO Mustang | 0.037 | Deposited to NSC, Nepalganj Methyl bromide Methyl bromide |
| 25 | AIC, Guleria | 0.051 | |
| 26 | NARC, Khumaltar | 22 cylinders | |
| 27 | CHC, Kirtipur | 21 cylinders | |
| Grand Total | | 74.257 m. tons + 43 cylinders of methyl bromide (each cylinders contains about 50 kg methyl bromide) | |

AIC = Agriculture Input Company; NSC = National Seed Committee; NARC = Nepal Agriculture Research Council;
 RARC = Regional Agriculture Research Council; DADO= District Agriculture Research Council; CHC Central Horticulture Centre
 Source: Ministry of Environment, Science and Technology (POPs Enabling Activities Project, 2007).

Table 8.6 : Waste Generation by Type from Selected Hospitals in the Kathmandu Valley

| Hospital | Wastes by Type, kg/day | | | | Percent of Wastes by Type | | | |
|----------------------|------------------------|-----------|--------|-------|---------------------------|-----------|--------|-------|
| | General | Hazardous | Sharps | Total | General | Hazardous | Sharps | Total |
| Bir Hospital | 521 | 120 | 60 | 701 | 74 | 17 | 9 | 100 |
| Om Hospital | 221 | 31 | 16 | 267 | 83 | 11 | 6 | 100 |
| TU Teaching Hospital | 456 | 105 | 53 | 614 | 74 | 17 | 9 | 100 |
| Patan Hospital | 304 | 70 | 35 | 410 | 74 | 17 | 9 | 100 |
| Maternity Home | 251 | 26 | 16 | 292 | 86 | 9 | 5 | 100 |
| Total | 1752 | 352 | 179 | 2282 | 77 | 15 | 8 | 100 |

Source: World Health Organization and Nepal Health Research Council-2005 (National Health Care Waste Management Guidelines).

Table 8.7 : Sewerage Service under NWSC

(sewerage length in km.)

| Year | Sewerage | Cumulative Length | Pop ⁿ Benefitted (%) |
|------|----------|-------------------|---------------------------------|
| 1995 | 4.31 | 4.31 | 40 |
| 1996 | 12.00 | 16.31 | |
| 1997 | 0.46 | 16.77 | |
| 1998 | 10.00 | 26.77 | |
| 1999 | 7.00 | 33.77 | |
| 2000 | 5.00 | 38.77 | |
| 2001 | 10.00 | 48.77 | |
| 2002 | 2.96 | 51.73 | |
| 2003 | 1.00 | 52.73 | |
| 2004 | 9.00 | 61.73 | |
| 2005 | 5.00 | 66.73 | |
| 2006 | 4.00 | 70.73 | |

Source: Nepal Water Supply Corporation.

Table 8.8 : Emission Guidelines for "Hospital/Medical/Infectious Waste" by Incinerator

| Pollutant | Small | Medium | Large |
|---|---------------------------|---------------------------|---------------------------|
| Particular matter | (<=91 kg/h) | (>91-227kg/h) | (>227 kg/h) |
| | 115 mg m ³ | 69 mg/ m ³ | |
| Carbon monoxide (Co) | 40 ppmv | 40ppmv | |
| Dioxins / furans | 125 mg/m ³ | 125 mg/m ³ | 125 mg/m ³ |
| | Total CCD/CCF or | Total CCD/CCF or | Total CCD/CCF or |
| | 2.3mg /m ³ TEQ | 2.3mg/m ³ TEQ | 2.3mg/m ³ TEQ |
| Hydrogen Chloride (HCl) | 100 ppmv or | 100 ppmv or | 100 ppmv or |
| | 93 % reduction | 93 % reduction | 93 % reduction |
| Sulfur dioxide (SO ₂) | 55 ppmv | 55 ppmv | 55 ppmv |
| Nitrogen oxides | 250 ppmv | 250 ppmv | 250 ppmv |
| Lead | 1.2 mg/m ³ or | 1.2 mg/m ³ or | 1.2 mg/m ³ or |
| | 70 % reduction | 70 % reduction | 70 % reduction |
| Cadmium | 0.16 mg/m ³ or | 0.16 mg/m ³ or | 0.16 mg/m ³ or |
| | 65 % reduction | 65 % reduction | 65 % reduction |
| Mercury | 0.55 mg/m ³ or | 0.55 mg/m ³ or | 0.55 mg/m ³ or |
| | 85 % reduction | 85 % reduction | 85 % reduction |
| Source: World Health Organization (Safe Management of Wastes from Health Care Activities and National Health Care Waste Management Guidelines, 2002). | | | |

Chapter IX

Human Settlements

Table 9.1 : Man-Land Ratio by Eco-Development Region, 2001

| Eco-Development Region | Cultivated Land* (ha) | Total Population** | Man-Land Ratio (p/Ha.) |
|-------------------------------|----------------------------------|---------------------------|-----------------------------------|
| NEPAL | 4061631 | 23151423 | 5.7 |
| Mountain | 518377 | 1687859 | 3.3 |
| Eastern | 209705 | 401587 | 1.9 |
| Central | 131326 | 554817 | 4.2 |
| Western | 564 | 24568 | 43.6 |
| Mid-western | 68769 | 309084 | 4.5 |
| Far-western | 108013 | 397803 | 3.7 |
| Hill | 1666363 | 10251111 | 6.2 |
| Eastern | 470656 | 1643246 | 3.5 |
| Central | 441167 | 3542732 | 8.0 |
| Western | 387327 | 2793180 | 7.2 |
| Mid-western | 199545 | 1473022 | 7.4 |
| Far-western | 167668 | 798931 | 4.8 |
| Tarai | 1876891 | 11212453 | 6.0 |
| Eastern | 549214 | 3299643 | 6.0 |
| Central | 553045 | 3934080 | 7.1 |
| Western | 308707 | 1753265 | 5.7 |
| Mid-western | 264218 | 1230869 | 4.7 |
| Far-western | 201707 | 994596 | 4.9 |
| Kathmandu Valley | 43670 | 1645091 | 37.7 |

Note : Cultivated land in this column includes grassland. Disaggregated data for cultivated land only is not available.

*Source: *Japan Forest Technology Association (JAFTA), 2001. **Central Bureau of Statistics, 2002.*

Table 9.2 : Population Size, Growth Rate and Doubling Time, 1911 – 2001

| Census year | Total Population | Population Change | Annual Growth Rate (Exponential) | Doubling Time |
|--------------------|-------------------------|--------------------------|---|----------------------|
| 1911 | 5,638,749 | | - | - |
| 1920 | 5,573,788 | - 64,961 | -0.13 | - |
| 1930 | 5,532,574 | 41,214 | -0.07 | - |
| 1941 | 6,283,649 | 7,51,075 | 1.16 | 60 |
| 1952-54 | 8,256,625 | 19,72,976 | 2.27 | 31 |
| 1961 | 9,412,996 | 11,56,371 | 1.64 | 42 |
| 1971 | 11,555,983 | 21,42,987 | 2.05 | 34 |
| 1981 | 15,022,839 | 34,66,856 | 2.62 | 26 |
| 1991 | 18,491,097 | 34,68,258 | 2.08 | 33 |
| 2001 | 23,151,423 | 46,60,326 | 2.25 | 31 |

Source : Central Bureau of Statistics, 1958, Table 2; Central Bureau of Statistics, 1968 Vol. III, Part II Table 2; Central Bureau of Statistics, 1975 Vol. I, Table 2; Central Bureau of Statistics, 1984 Vol. I, Table 4; Central Bureau of Statistics, 1993 Vol. I, Table 5; Central Bureau of Statistics, 2002 National Report Vol. I, Table 1.

Table 9.3 : Population Growth Rates by Ecological Zone, Nepal, 1961-2001

| Period | Average Annual Growth Rate of Population 1961-2001 | | | | |
|-----------|--|------|-----------------|-------|-------|
| | Mountain | Hill | Mountain + Hill | Terai | Total |
| 1961-1971 | - | - | 1.85 | 2.39 | 2.05 |
| 1971-1981 | 1.35 | 1.65 | 1.61 | 4.11 | 2.62 |
| 1981-1991 | 1.02 | 1.61 | 1.52 | 2.75 | 2.08 |
| 1991-2001 | 1.57 | 1.97 | 1.91 | 2.62 | 2.25 |

Note : Growth rates are exponential rate of growth .

Source : Central Bureau of Statistics (1995 p 27; 2002, National Report).

Table 9.4 : Population Density by Ecological Zone & Development Region, Nepal, 1981-2001

| Zones/Regions | | Eastern | Central | Western | Mid Western | Far Western | Total |
|----------------|-------------|---------|---------|---------|-------------|-------------|--------|
| Mountain | Area sq. km | 10438 | 6277 | 5819 | 21351 | 7932 | 51817 |
| Density Person | 1981 | 32.41 | 65.82 | 3.43 | 11.35 | 36.42 | 25.14 |
| per sq.km | 1991 | 34.40 | 75.03 | 3.37 | 12.20 | 41.95 | 27.85 |
| | 2001 | 38.47 | 88.39 | 4.22 | 14.48 | 50.15 | 32.57 |
| Hill | Area sq. km | 10749 | 11805 | 18319 | 13710 | 6762 | 61345 |
| Density Person | 1981 | 116.94 | 178.60 | 117.41 | 76.03 | 89.37 | 116.76 |
| per sq.km | 1991 | 132.95 | 226.98 | 132.15 | 88.95 | 99.18 | 137.25 |
| | 2001 | 152.87 | 300.10 | 152.47 | 107.44 | 118.15 | 167.11 |
| Terai | Area sq. km | 7269 | 9328 | 5260 | 7317 | 4845 | 34024 |
| Density Person | 1981 | 290.70 | 255.97 | 182.11 | 91.67 | 88.23 | 192.71 |
| per sq.km | 1991 | 365.72 | 325.18 | 252.87 | 127.14 | 139.62 | 253.58 |
| | 2001 | 453.93 | 421.75 | 333.32 | 168.22 | 205.28 | 329.59 |
| Total | Area sq.km. | 28456 | 27410 | 29398 | 42378 | 19539 | 147181 |
| Density Person | 1981 | 130.32 | 179.10 | 106.43 | 46.14 | 67.56 | 102.01 |
| per sq.km. | 1991 | 156.25 | 225.61 | 128.26 | 56.87 | 85.95 | 125.63 |
| | 2001 | 187.82 | 293.02 | 155.49 | 71.10 | 112.15 | 157.30 |

Source : Central Bureau of Statistics (1995 p. 54, National Report 2002).

Table 9.5 : Percentage of Household by Types of House for Urban/Rural Residence

| Type of House | Nepal | | Urban | Rural |
|----------------|------------------|------------------|----------------|------------------|
| | 1991 | 2001 | 2001 | 2001 |
| Pakki | 23.5 | 36.6 | 68.2 | 30.6 |
| Ardha-pakki | 24.8 | 29.2 | 16.1 | 31.7 |
| Kachchi | 49.7 | 33.5 | 15.2 | 36.9 |
| Others | 2.0 | 0.7 | 0.4 | 0.8 |
| Total % | 100.0 | 100.0 | 100.0 | 100.0 |
| Number | 3,328,721 | 4,174,374 | 664,507 | 3,509,867 |

Source : Central Bureau of Statistics (Population Census 1991 Vol. III. Household Characteristics, Table 1.)

Central Bureau of Statistics (Population Census 2001, National Report, Vol I, Table 3.)

Table 9.6 : Percentage Distribution of Household by Type of House For Ecological Zones

| Type of House | Mountain | | Hill | | Terai | |
|----------------|----------------|----------------|------------------|------------------|------------------|------------------|
| | 1991 | 2001 | 1991 | 2001 | 1991 | 2001 |
| Pakki | 32.4 | 44.8 | 34.7 | 51.1 | 10.4 | 20.8 |
| Ardha-pakki | 47.3 | 41.6 | 33.1 | 30.8 | 12.2 | 25.7 |
| Kachchi | 19.2 | 13.0 | 31.0 | 17.6 | 75.2 | 52.4 |
| Others | 1.1 | 0.6 | 1.2 | 0.5 | 2.2 | 1.0 |
| Total % | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Number | 274,135 | 285,213 | 1,558,493 | 1,951,191 | 1,496,093 | 1,937,970 |

Source : Central Bureau of Statistics (Population Census 1991 Vol. III. Household Characteristics, Table 1.)

Central Bureau of Statistics (Population Census 2001, National Report, Vol I, Table 3.)

Table 9.7 : Distribution of Households by Various Sources of Fuel Use for Lighting by Region, Nepal 2001

| Area | Main source of fuel used for lighting | | | | | Total Households |
|---------------------------|---------------------------------------|-------------|------------|------------|---------------|------------------|
| | Electricity | Kerosene | Bio Gas | Others | Total Percent | |
| Nepal | 39.8 | 57.7 | 0.2 | 2.3 | 100.0 | 4,174,457 |
| <i>Place of Residence</i> | | | | | | |
| Urban | 83.4 | 16.2 | 0.2 | 0.2 | 100.0 | 664,507 |
| Rural | 31.5 | 65.6 | 0.2 | 2.7 | 100.0 | 3,509,950 |
| Ecological Belt | | | | | | |
| Mountain | 21.4 | 66.3 | 0.0 | 12.3 | 100.0 | 285,213 |
| Hill | 43.2 | 53.9 | 0.2 | 2.8 | 100.0 | 1,951,191 |
| Terai | 39.1 | 60.4 | 0.2 | 0.3 | 100.0 | 1,938,053 |
| Development Region | | | | | | |
| Eastern | 30.5 | 68.6 | 0.2 | 0.7 | 100.0 | 1,000,441 |
| Central | 53.2 | 46.3 | 0.2 | 0.3 | 100.0 | 1,465,753 |
| Western | 42.8 | 56.2 | 0.2 | 0.7 | 100.0 | 863,045 |
| Mid Western | 25.4 | 63.6 | 0.2 | 10.8 | 100.0 | 479,817 |
| Far Western | 23.1 | 69.6 | 0.2 | 7.1 | 100.0 | 365,401 |

Source : Central Bureau of Statistics (Population Census, 2001).

**Table 9.8 : Distribution of Households by Various Sources of Fuel Use
for Cooking by Region, Nepal, 2001**

| Area | Main source of fuel used for cooking | | | | | | | Total Households |
|---------------------------|--------------------------------------|----------|------|---------|----------|--------|---------------|------------------|
| | Wood | Kerosene | LPG | Bio-gas | Cow Dung | Others | Total Percent | |
| Nepal | 66.2 | 13.7 | 7.7 | 1.7 | 10.1 | 0.7 | 100.0 | 4174458 |
| <i>Place of Residence</i> | | | | | | | | |
| Urban | 33.2 | 34.1 | 27.3 | 1.8 | 2.5 | 1.0 | 100.0 | 664400 |
| Rural | 72.4 | 9.8 | 4.0 | 1.7 | 11.5 | 0.6 | 100.0 | 3510058 |
| <i>Ecological Belt</i> | | | | | | | | |
| Mountain | 95.5 | 3.2 | 0.4 | 0.1 | 0.7 | 0.2 | 100.0 | 285229 |
| Hill | 72.3 | 16.0 | 8.9 | 1.9 | 0.1 | 0.8 | 100.0 | 1950822 |
| Terai | 55.6 | 12.8 | 7.7 | 1.7 | 21.5 | 0.7 | 100.0 | 1938407 |
| <i>Development Region</i> | | | | | | | | |
| Eastern | 66.3 | 9.9 | 4.3 | 1.2 | 17.7 | 0.6 | 100.0 | 1000362 |
| Central | 55.6 | 19.3 | 11.2 | 1.2 | 11.4 | 1.3 | 100.0 | 1465813 |
| Western | 65.3 | 13.1 | 10.3 | 3.4 | 7.6 | 0.3 | 100.0 | 863049 |
| Mid Western | 81.0 | 11.3 | 4.3 | 1.1 | 2.1 | 0.2 | 100.0 | 479817 |
| Far Western | 90.8 | 5.5 | 1.9 | 1.5 | 0.1 | 0.3 | 100.0 | 365417 |

Source : Central Bureau of Statistics (Population Census, 2001).

Table 9.9 : Types of House (Housing Unit) by Development Region, 2001

| Development Region | Pakki | Semi Pakki | Kachchi | Others | Total | Percent |
|--|----------------|----------------|----------------|--------------|----------------|---------------|
| Eastern | 142927 | 329716 | 517405 | 10310 | 1000358 | 23.96 |
| Central | 612400 | 393557 | 449160 | 10636 | 1465753 | 35.11 |
| Western | 451359 | 224236 | 181995 | 5455 | 863045 | 20.67 |
| Mid Western | 129528 | 184126 | 163320 | 2843 | 479817 | 11.49 |
| Far Western | 191823 | 86603 | 84927 | 2048 | 365401 | 8.75 |
| Total | 1528037 | 1218238 | 1396807 | 31292 | 4174374 | 100.00 |
| Percentage of housing units in 2001 | 36.61 | 29.18 | 33.46 | 0.75 | 100.00 | |
| Percentage of housing units in 1991 | 23.50 | 24.80 | 49.70 | 2.00 | 100.00 | |

Pakki = House built with concrete and permanent materials.

Semi-pakki = House built with semi concrete permanent and temporary materials.

Kachchi = House built with non- durable temporary materials.

Others = Not Stated are included.

Source : Central Bureau of Statistics (National Population Census, 2001).

Table 9.10 : Distribution of House, Household and Average Household per House for Urban-Rural, Ecological Zones and Development Regions, 2001

| Area | House | Household | Average household per house |
|---------------------------|------------------|------------------|-----------------------------|
| Nepal | 3,598,212 | 4,174,374 | 1.16 |
| Urban | 436,533 | 664,507 | 1.52 |
| Rural | 3,161,679 | 3,509,867 | 1.11 |
| Ecological Zone | | | |
| Mountain Zone | 253,006 | 285,213 | 1.13 |
| Hill Zone | 1,667,410 | 1,951,191 | 1.17 |
| Terai Zone | 1,677,796 | 1,937,970 | 1.16 |
| Development Region | | | |
| Eastern | 898,616 | 1,000,358 | 1.11 |
| Central | 1,175,867 | 1,465,753 | 1.25 |
| Western | 776,788 | 863,045 | 1.11 |
| Mid Western | 439,906 | 479,817 | 1.09 |
| Far Western | 307,035 | 365,401 | 1.19 |

Source: Central Bureau of Statistics (2003). Special tabulation National Population Census 2001.

Central Bureau of Statistics (2002). Population Census 2001 National Report, Vol. I Tab. 2.

Table 9.11 : Percentage Distribution of House by Number of Household Residing in the House for Rural-Urban, Ecological Zones and Development Regions, 2001

| Area | Percentage of House Having Number of Household | | | |
|---------------------------|--|-------------|-------------|----------------------|
| | 1 | 2 - 3 | 4+ | Total House (Number) |
| Nepal | 90.17 | 8.48 | 1.35 | 3,598,212 |
| Urban | 75.14 | 18.68 | 6.18 | 436,533 |
| Rural | 92.25 | 7.07 | 0.68 | 3,161,679 |
| Ecological Zone | | | | |
| Mountain Zone | 90.54 | 8.82 | 0.64 | 253,006 |
| Hill Zone | 90.28 | 8.17 | 1.55 | 1,667,410 |
| Terai Zone | 90.02 | 8.73 | 1.25 | 1,677,796 |
| Development Region | | | | |
| Eastern | 92.74 | 6.36 | 0.91 | 898,616 |
| Central | 86.65 | 10.86 | 2.49 | 1,175,867 |
| Western | 92.39 | 6.85 | 0.76 | 776,788 |
| Mid Western | 93.36 | 6.13 | 0.51 | 439,906 |
| Far Western | 85.99 | 13.04 | 0.97 | 307,035 |

Source : Central Bureau of Statistics (2003), Special Tabulation National Population Census, 2001.

Table 9.12 : Population Distribution and Composition, 1971-2001

(population in %)

| Population Distribution | 1971 | 1981 | 1991 | 2001 |
|------------------------------------|-------------|-------------|-------------|-------------|
| Ecological belt | | | | |
| Mountain | 9.9 | 8.7 | 7.8 | 7.29 |
| Hill | 52.5 | 47.7 | 45.5 | 44.28 |
| Tarai | 37.6 | 43.6 | 46.7 | 48.43 |
| Residence | | | | |
| Rural | 96 | 93 | 91 | 86 |
| Urban | 4 | 7 | 9 | 14 |
| Development | | | | |
| Eastern | 24 | 24 | 24 | 23 |
| Central | 33 | 33 | 34 | 35 |
| Western | 21 | 21 | 20 | 20 |
| Mid-western | 13 | 13 | 13 | 13 |
| Far western | 9 | 9 | 9 | 9 |
| Total | 100 | 100 | 100 | 100 |
| Population composition | | | | |
| A . Biological composition | | | | |
| By age | | | | |
| 0-14 | 40 | 41 | 42 | 39 |
| 15-59 | 54 | 53 | 52 | 54 |
| 60+ | 6 | 6 | 6 | 7 |
| Total | 100 | 100 | 100 | 100 |
| By sex | | | | |
| Male | 50.34 | 51.22 | 49.87 | 49.95 |
| Female | 49.66 | 48.78 | 50.13 | 50.05 |
| Sex ratio | 1.01 | 1.05 | 99.5 | 99.8 |
| By race (cast/ethnic group) | | | | |
| Chhetri | | | 16.05 | 15.30 |
| Bramhin | | | 13.8 | 12.74 |
| Magar | | | 7.24 | 7.14 |
| Tharu | | | 6.71 | 6.75 |
| Tamang | | | 5.51 | 5.64 |
| Newar | | | 5.63 | 5.48 |
| Muslim | | | 4.12 | 4.24 |
| Others | | | 40.94 | 42.71 |
| Total | | | 100 | 100 |
| B. Cultural composition | | | | |
| By literacy 6+ | | | | |
| Male | | 34 | 54 | 65.5 |
| Female | | 12 | 25 | 42.8 |
| Total | | 23.3 | 39.6 | 54.1 |

Table 9.12 : Population Distribution and Composition, 1971-2001 (contd...)

(population in %)

| Population Distribution | 1971 | 1981 | 1991 | 2001 |
|--|-------------|-------------|-------------|-------------|
| By religion | | | | |
| Hindu | | 90 | 86 | 81 |
| Baudha | | 5 | 8 | 11 |
| Islam | | 3 | 4 | 4 |
| Others | | 2.5 | 2.1 | 4 |
| By language | | | | |
| Nepali | | 58 | 50 | 48.6 |
| Maithali | | 11.1 | 11.8 | 12.3 |
| Bhojpur | | 7.6 | 7.5 | 7.5 |
| Tharu | | 3.6 | 5.4 | 5.8 |
| Tamang | | 3.5 | 4.9 | 5.2 |
| Newar | | 3 | 3.5 | 3.6 |
| Others | | 13.2 | 16.9 | 17 |
| C. Economic composition | | | | |
| By employment status | | | | |
| Employer | | | | 3.81 |
| Employee | | | | 24.63 |
| Self employed | | | | 62.73 |
| Unpaid family worker | | | | 8.83 |
| Total | | | | 100 |
| By occupation | | | | |
| Agriculture | | 91.4 | 81.1 | 65 |
| Non- agriculture | | 6.3 | 18.6 | 35 |
| Not stated | | 2.3 | 0.3 | 0 |
| Occupational classifications | | | | |
| Manager / Administrator / Legislator | | 0.1 | 0.3 | 0.6 |
| Professional | | 0.9 | 1.8 | 2.5 |
| Technician | | | | 1.7 |
| Clerks | | 0.7 | 1.1 | 2.03 |
| Service worker | | 1.5 | 9.2 | 7.9 |
| Agriculture / livestock / forestry / fisheries | | 92.2 | 81.2 | 65.7 |
| Craft production worker | | | | 9.3 |
| Plant production worker | | | | 1.4 |
| Elementary | | | | 8.8 |

Source: Central Bureau of Statistics (National Population Censuses).

Table 9.13 : Population by Development Region, Ecological Belt and Residence, 2001

| Area | Population, 2001 (in number) | | | Percent (%) | Number of House- holds | Aver- age House- hold Size | Area in sq. km | Popula- tion Density Person/ sq. km |
|--------------------------------|---------------------------------|-------------------|-------------------|----------------|------------------------------|--|-------------------|---|
| | Total | Male | Female | | | | | |
| Nepal | 23,151,423 | 11,563,921 | 11,587,502 | 100 | 4,253,220 | 5.44 | 147,181 | 157 |
| Eastern | 5,344,476 | 2,670,622 | 2,673,854 | 23.08 | 1,012,968 | 5.28 | 28,456 | 188 |
| Central | 8,031,629 | 4,109,059 | 3,922,570 | 34.69 | 1,475,477 | 5.44 | 27,410 | 293 |
| Western | 4,571,013 | 2,198,170 | 2,372,843 | 19.74 | 863,045 | 5.3 | 29,398 | 155 |
| Mid Western | 3,012,975 | 1,500,526 | 1,512,449 | 13.01 | 534,310 | 5.64 | 42,378 | 71 |
| Far Western | 2,191,330 | 1,085,544 | 1,105,786 | 9.47 | 367,420 | 5.96 | 19,539 | 112 |
| Ecological Belt | | | | | | | | |
| Mountain | 1,687,859 | 837,060 | 850,799 | 7.29 | 319,887 | 5.28 | 51,817 | 33 |
| Hill | 10,251,111 | 5,016,802 | 5,234,309 | 44.28 | 1,982,753 | 5.17 | 61,345 | 167 |
| Tarai | 11,212,453 | 5,710,059 | 5,502,394 | 48.43 | 1,950,580 | 5.75 | 34,019 | 330 |
| Types of Residence* | | | | | | | | |
| Rural | 19,509,055 | 9,899,559 | 10,023,985 | 86 | 3,588,713 | 5.44 | 143,905 | 136 |
| Urban | 3,227,879 | 1,664,362 | 1,563,517 | 14 | 664,507 | 4.85 | 3,276 | 985 |

Source : Central Bureau of Statistics (National Population Census 2001 * Based on form no 2).

Table 9.14 : Population, Households and Population Density by District, 2001

| S. N. | Area | Population 2001 | | | | Number of House holds | Average House hold Size | Area in sq. km | Populat ion Density Person/sq. km |
|-------|----------------|-----------------|---------|---------|-------------|-----------------------|-------------------------|----------------|-----------------------------------|
| | | Number | | | Percent (%) | | | | |
| | | Total | Male | Female | | | | | |
| 1 | Taplejung | 134,698 | 66,205 | 68,493 | 0.58 | 24,764 | 5.44 | 3,646 | 37 |
| 2 | Sankhuwasabha | 159,203 | 77,853 | 81,350 | 0.69 | 30,766 | 5.17 | 3,480 | 46 |
| 3 | Solukhumbu | 107,686 | 53,173 | 54,513 | 0.47 | 21,667 | 4.97 | 3,312 | 33 |
| 4 | Panchthar | 202,056 | 99,042 | 103,014 | 0.87 | 37,260 | 5.42 | 1,241 | 163 |
| 5 | Ilam | 282,806 | 142,434 | 140,372 | 1.22 | 54,565 | 5.18 | 1,703 | 166 |
| 6 | Dhankuta | 166,479 | 81,841 | 84,638 | 0.72 | 32,571 | 5.11 | 891 | 187 |
| 7 | Terhathum | 113,111 | 54,932 | 58,179 | 0.49 | 20,682 | 5.47 | 679 | 167 |
| 8 | Bhojpur | 203,018 | 97,762 | 105,256 | 0.88 | 39,481 | 5.14 | 1,507 | 135 |
| 9 | Okhaldhunga | 156,702 | 75,361 | 81,341 | 0.68 | 30,121 | 5.2 | 1,074 | 146 |
| 10 | Khotang | 231,385 | 112,821 | 118,564 | 1 | 42,866 | 5.4 | 1,591 | 145 |
| 11 | Udayapur | 287,689 | 143,756 | 143,933 | 1.24 | 51,603 | 5.58 | 2,063 | 139 |
| 12 | Jhapa* | 688,109 | 341,675 | 346,434 | 2.97 | 137,301 | 5.01 | 1,606 | 428 |
| 13 | Morang | 843,220 | 422,895 | 420,325 | 3.64 | 167,875 | 5.02 | 1,855 | 455 |
| 14 | Sunsari | 625,633 | 315,530 | 310,103 | 2.7 | 120,295 | 5.2 | 1,257 | 498 |
| 15 | Saptari | 570,282 | 291,409 | 278,873 | 2.46 | 101,141 | 5.64 | 1,363 | 418 |
| 16 | Siraha* | 572,399 | 293,933 | 278,466 | 2.47 | 100,010 | 5.72 | 1,188 | 482 |
| 17 | Dolakha* | 204,229 | 99,963 | 104,266 | 0.88 | 43,165 | 4.73 | 2,191 | 93 |
| 18 | Sindhupalchok* | 305,857 | 152,012 | 153,845 | 1.32 | 60,452 | 5.06 | 2,542 | 120 |
| 19 | Rasuwa | 44,731 | 23,355 | 21,376 | 0.19 | 8,696 | 5.14 | 1,544 | 29 |
| 20 | Sindhuli* | 279,821 | 139,280 | 140,541 | 1.21 | 48,758 | 5.74 | 2,491 | 112 |
| 21 | Ramechhap | 212,408 | 100,853 | 111,555 | 0.92 | 40,386 | 5.26 | 1,546 | 137 |
| 22 | Kavrepalanchok | 385,672 | 188,947 | 196,725 | 1.67 | 70,509 | 5.47 | 1,396 | 276 |
| 23 | Lalitpur | 337,785 | 172,455 | 165,330 | 1.46 | 68,922 | 4.9 | 385 | 877 |
| 24 | Bhaktapur | 225,461 | 114,798 | 110,663 | 0.97 | 41,253 | 5.47 | 119 | 1,895 |
| 25 | Kathmandu | 1,081,845 | 576,010 | 505,835 | 4.67 | 235,387 | 4.6 | 395 | 2,739 |
| 26 | Nuwakot | 288,478 | 142,731 | 145,747 | 1.25 | 53,169 | 5.43 | 1,121 | 257 |
| 27 | Dhading | 338,658 | 165,864 | 172,794 | 1.46 | 62,759 | 5.4 | 1,926 | 176 |
| 28 | Makwanpur | 392,604 | 199,144 | 193,460 | 1.7 | 71,112 | 5.52 | 2,426 | 162 |
| 29 | Dhanusa | 671,364 | 349,422 | 321,942 | 2.9 | 117,417 | 5.72 | 1,180 | 569 |
| 30 | Mahottari | 553,481 | 287,905 | 265,576 | 2.39 | 94,229 | 5.87 | 1,002 | 552 |
| 31 | Sarlahi | 635,701 | 329,182 | 306,519 | 2.75 | 111,076 | 5.72 | 1,259 | 505 |
| 32 | Rautahat | 545,132 | 282,246 | 262,886 | 2.35 | 88,162 | 6.18 | 1,126 | 484 |
| 33 | Bara | 559,135 | 289,397 | 269,738 | 2.42 | 87,706 | 6.38 | 1,190 | 470 |
| 34 | Parsa | 497,219 | 260,411 | 236,808 | 2.15 | 79,456 | 6.26 | 1,353 | 367 |
| 35 | Chitawan | 472,048 | 235,084 | 236,964 | 2.04 | 92,863 | 5.08 | 2,218 | 213 |
| 36 | Manang | 9,587 | 5,034 | 4,553 | 0.04 | 1,776 | 5.4 | 2,246 | 4 |
| 37 | Mustang | 14,981 | 8,180 | 6,801 | 0.06 | 3,243 | 4.62 | 3,573 | 4 |
| 38 | Gorkha | 288,134 | 134,407 | 153,727 | 1.24 | 58,923 | 4.89 | 3,610 | 80 |
| 39 | Lamjung | 177,149 | 83,406 | 93,743 | 0.77 | 36,525 | 4.85 | 1,692 | 105 |
| 40 | Tanahu | 315,237 | 146,788 | 168,449 | 1.36 | 62,898 | 5.01 | 1,546 | 204 |
| 41 | Syangja | 317,320 | 143,619 | 173,701 | 1.37 | 64,746 | 4.9 | 1,164 | 273 |
| 42 | Kaski | 380,527 | 184,995 | 195,532 | 1.64 | 85,075 | 4.47 | 2,017 | 189 |
| 43 | Myagdi | 114,447 | 53,178 | 61,269 | 0.49 | 24,435 | 4.68 | 2,297 | 50 |
| 44 | Parbat | 157,826 | 72,942 | 84,884 | 0.68 | 32,731 | 4.82 | 494 | 319 |
| 45 | Baglung | 268,937 | 123,528 | 145,409 | 1.16 | 53,565 | 5.02 | 1,784 | 151 |
| 46 | Gulmi | 296,654 | 133,771 | 162,883 | 1.28 | 59,189 | 5.01 | 1,149 | 258 |
| 47 | Palpa | 268,558 | 125,068 | 143,490 | 1.16 | 49,942 | 5.38 | 1,373 | 196 |

Table 9.14 : Population, Households and Population Density by District, 2001 (contd...)

| S. N. | Area | Population 2001 | | | | Number of House holds | Average House hold Size | Area in sq. km | Population Density Person/ sq. km |
|-------|--------------|-----------------|------------|------------|-------------|-----------------------|-------------------------|----------------|-----------------------------------|
| | | Number | | | Percent (%) | | | | |
| | | Total | Male | Female | | | | | |
| 48 | Arghakhanchi | 208,391 | 96,349 | 112,042 | 0.9 | 40,869 | 5.1 | 1,193 | 175 |
| 49 | Nawalparasi | 562,870 | 278,257 | 284,613 | 2.43 | 98,340 | 5.72 | 2,162 | 260 |
| 50 | Rupandehi | 708,419 | 360,773 | 347,646 | 3.06 | 117,856 | 6.01 | 1,360 | 521 |
| 51 | Kapilbastu | 481,976 | 247,875 | 234,101 | 2.08 | 72,932 | 6.61 | 1,738 | 277 |
| 52 | Dolpa* | 29,545 | 14,735 | 14,810 | 0.13 | 5,812 | 5.08 | 7,889 | 4 |
| 53 | Jumla* | 89,427 | 45,848 | 43,579 | 0.39 | 15,850 | 5.64 | 2,531 | 35 |
| 54 | Kalikot* | 105,580 | 53,189 | 52,391 | 0.46 | 18,487 | 5.71 | 1,741 | 61 |
| 55 | Mugu* | 43,937 | 22,250 | 21,687 | 0.19 | 8,261 | 5.32 | 3,535 | 12 |
| 56 | Humla | 40,595 | 20,962 | 19,633 | 0.18 | 6,953 | 5.84 | 5,655 | 7 |
| 57 | Pyuthan | 212,484 | 98,390 | 114,094 | 0.92 | 40,183 | 5.29 | 1,309 | 162 |
| 58 | Rolpa | 210,004 | 101,592 | 108,412 | 0.91 | 38,512 | 5.45 | 1,879 | 112 |
| 59 | Rukum | 188,438 | 95,432 | 93,006 | 0.81 | 33,501 | 5.62 | 2,877 | 65 |
| 60 | Salyan* | 213,500 | 106,834 | 106,666 | 0.92 | 38,084 | 5.61 | 1,462 | 146 |
| 61 | Surkhet* | 288,527 | 142,817 | 145,710 | 1.25 | 54,047 | 5.34 | 2,451 | 118 |
| 62 | Dailekh | 225,201 | 110,125 | 115,076 | 0.97 | 41,140 | 5.47 | 1,502 | 150 |
| 63 | Jajarkot | 134,868 | 68,508 | 66,360 | 0.58 | 24,147 | 5.59 | 2,230 | 60 |
| 64 | Dang | 462,380 | 228,958 | 233,422 | 2 | 82,495 | 5.6 | 2,955 | 156 |
| 65 | Banke | 385,840 | 198,231 | 187,609 | 1.67 | 67,269 | 5.74 | 2,337 | 165 |
| 66 | Bardiya | 382,649 | 192,655 | 189,994 | 1.65 | 59,569 | 6.42 | 2,025 | 189 |
| 67 | Bajura* | 108,781 | 53,834 | 54,947 | 0.47 | 20,378 | 5.34 | 2,188 | 50 |
| 68 | Bajhang | 167,026 | 80,676 | 86,350 | 0.72 | 28,588 | 5.84 | 3,422 | 49 |
| 69 | Darchula | 121,996 | 59,791 | 62,205 | 0.53 | 21,029 | 5.8 | 2,322 | 53 |
| 70 | Achham | 231,285 | 108,998 | 122,287 | 1 | 44,005 | 5.26 | 1,680 | 138 |
| 71 | Doti | 207,066 | 103,521 | 103,545 | 0.89 | 36,465 | 5.68 | 2,025 | 102 |
| 72 | Dadeldhura | 126,162 | 60,965 | 65,197 | 0.54 | 21,980 | 5.74 | 1,538 | 82 |
| 73 | Baitadi | 234,418 | 113,538 | 120,880 | 1.01 | 40,387 | 5.8 | 1,519 | 154 |
| 74 | Kailali | 616,697 | 312,311 | 304,386 | 2.66 | 94,430 | 6.53 | 3,235 | 191 |
| 75 | Kanchanpur | 377,899 | 191,910 | 185,989 | 1.63 | 60,158 | 6.28 | 1,610 | 235 |
| Nepal | | 23,151,423 | 11,563,921 | 11,587,502 | 100 | 4,253,220 | 5.44 | 147,181 | 157 |

Note : Districts with *symbol includes population, independent estimates or received from household listing of those Village Development Committees and Wards which could not be enumerated at the time of census.

Source : Central Bureau of Statistics (National Population Census, 2001).

Table 9.15 : Urban Population and Density by Municipality

| S. N. | Municipality | 1991 | 2001 | | | | |
|-------|---------------|------------|--------|------------|-------------------------------|----------------|-------------------------|
| | | Population | HHs | Population | Annual Population Growth Rate | Area in sq. km | Pop. Density per sq. km |
| 1 | Amargadhi | 16454 | 3538 | 18390 | 1.12 | 138.95 | 132.35 |
| 2 | Baglung | 15219 | 4847 | 20852 | 3.2 | 18.35 | 1136.35 |
| 3 | Banepa | 12537 | 3015 | 15822 | 2.35 | 5.56 | 2845.68 |
| 4 | Bhadrapur | 15210 | 3896 | 18145 | 1.78 | 10.56 | 1718.28 |
| 5 | Bhaktapur | 61405 | 12133 | 72543 | 1.68 | 6.56 | 11058.38 |
| 6 | Bharatpur | 53836 | 19922 | 89323 | 5.19 | 162.16 | 550.83 |
| 7 | Bhimeshwar | 19259 | 4909 | 21916 | 1.3 | 65.04 | 336.96 |
| 8 | Bidur | 18694 | 4234 | 21193 | 1.26 | 33.48 | 633 |
| 9 | Biratnagar | 129388 | 33678 | 166674 | 2.56 | 58.48 | 2800.1 |
| 10 | Birendranagar | 22973 | 7139 | 31381 | 3.17 | 34.95 | 897.88 |
| 11 | Birgunj | 69005 | 19910 | 112484 | 5.01 | 21.17 | 5313.37 |
| 12 | Butawal | 44272 | 16281 | 75384 | 5.47 | 69.28 | 1088.11 |
| 13 | Byas | 20124 | 6511 | 28245 | 3.45 | 60.02 | 470.59 |
| 14 | Damak | 41321 | 7178 | 35009 | -1.64 | 70.63 | 495.67 |
| 15 | Dashrathchand | 18054 | 3481 | 18345 | 0.16 | 55.01 | 333.48 |
| 16 | Dhangadhi | 44753 | 11738 | 67447 | 4.19 | 103.73 | 650.22 |
| 17 | Dhankuta | 17073 | 4789 | 20668 | 1.93 | 48.21 | 428.71 |
| 18 | Dharan | 66457 | 20428 | 95332 | 3.67 | 103.38 | 922.15 |
| 19 | Dhulikhel | 9812 | 2255 | 11521 | 1.62 | 12.08 | 953.73 |
| 20 | Dipayal | 12360 | 4203 | 22061 | 5.96 | 73.98 | 298.2 |
| 21 | Gaur | 20434 | 3956 | 25383 | 2.19 | 21.53 | 1178.96 |
| 22 | Guleria | 30631 | 7939 | 46011 | 4.15 | 95.14 | 483.61 |
| 23 | Hetauda | 54670 | 14271 | 68482 | 2.28 | 47.77 | 1433.58 |
| 24 | Ilam | 13197 | 4007 | 16237 | 2.09 | 26.63 | 609.73 |
| 25 | Inaruwa | 18547 | 4497 | 23200 | 2.26 | 22.36 | 1037.57 |
| 26 | Itahari | 26824 | 8624 | 41210 | 4.39 | 42.37 | 972.62 |
| 27 | Jaleshwar | 18088 | 3680 | 22046 | 2.00 | 15.49 | 1423.24 |
| 28 | Janakpur | 54710 | 13734 | 74192 | 3.09 | 24.61 | 3014.71 |
| 29 | Kalaiya | 18498 | 5113 | 32260 | 5.72 | 18.98 | 1699.68 |
| 30 | Kamalamai | 24368 | 6447 | 32838 | 3.03 | 207.95 | 157.91 |
| 31 | Kapilbastu | 17126 | 4338 | 27170 | 4.72 | 37.2 | 730.38 |
| 32 | Kathmandu | 421258 | 152155 | 671846 | 4.78 | 49.45 | 13586.37 |
| 33 | Khandbari | 18756 | 4624 | 21789 | 1.51 | 91.03 | 239.36 |
| 34 | Kirtipur | 31338 | 9487 | 40835 | 2.68 | 14.76 | 2766.6 |
| 35 | Lahan | 19018 | 5262 | 27654 | 3.81 | 20.23 | 1366.98 |
| 36 | Lalitpur | 115865 | 34996 | 162991 | 3.47 | 15.15 | 10758.48 |
| 37 | Lekhanath | 30107 | 9362 | 41369 | 3.23 | 77.45 | 534.14 |
| 38 | Bhimdatta | 62050 | 13738 | 80839 | 2.68 | 171.24 | 472.08 |
| 39 | Malangawa | 14142 | 3141 | 18484 | 2.71 | 9.39 | 1968.48 |
| 40 | Mechinagar | 37108 | 9926 | 49060 | 2.83 | 55.72 | 880.47 |
| 41 | Narayan | 15728 | 3854 | 19446 | 2.14 | 67.01 | 290.2 |
| 42 | Nepalgunj | 47819 | 10592 | 57535 | 1.87 | 12.51 | 4599.12 |
| 43 | Panaudi | 20467 | 5134 | 25563 | 2.25 | 31.73 | 805.64 |
| 44 | Pokhara | 95286 | 37305 | 156312 | 5.07 | 55.22 | 2830.71 |
| 45 | Gorkha | 20633 | 5588 | 25783 | 2.25 | 60.28 | 427.72 |
| 46 | Putalibazar | 25870 | 6675 | 29667 | 1.38 | 70.14 | 422.97 |

Table 9.15 : Urban Population and Density by Municipality (contd...)

| S. N. | Municipality | 1991 | 2001 | | | | |
|--------------|-----------------|----------------|---------------|----------------|-------------------------------|----------------|-------------------------|
| | | Population | HHs | Population | Annual Population Growth Rate | Area in sq. km | Pop. Density per sq. km |
| 47 | Rajbiraj | 24227 | 5445 | 30353 | 2.28 | 11.96 | 2537.88 |
| 48 | Ramgram | 31297 | 3893 | 22630 | -3.19 | 34.72 | 651.79 |
| 49 | Ratnanagar | 25118 | 7456 | 37791 | 4.17 | 35.62 | 1060.95 |
| 50 | Siddharthanagar | 39473 | 9419 | 52569 | 2.91 | 36.03 | 1459.03 |
| 51 | Siraha | 21004 | 4314 | 23988 | 1.34 | 23.78 | 1008.75 |
| 52 | Tansen | 13599 | 4813 | 20431 | 4.15 | 21.72 | 940.65 |
| 53 | Thimi | 31970 | 9591 | 47751 | 4.09 | 11.11 | 4298.02 |
| 54 | Tikapur | 25639 | 6287 | 38722 | 4.21 | 67.11 | 576.99 |
| 55 | Ghorahi | 29050 | 8945 | 43126 | 4.03 | 74.45 | 579.26 |
| 56 | Triyuga | 23871 | 10506 | 55291 | 8.76 | 319.88 | 172.85 |
| 57 | Tulsipur | 22654 | 7056 | 33876 | 4.11 | 92.22 | 367.34 |
| 58 | Waling | 16712 | 4292 | 20414 | 2.02 | 34.76 | 587.28 |
| Total | | 2285358 | 664547 | 3227879 | 3.51 | 3276.28 | 985.23 |

Source : Central Bureau of Statistics (National Population Censuses).

Table 9.16 : Number of Registered Vehicles, 1989/90 - 2007/08

| Year | Total Registered Vehicles | Cumulative Number of Vehicles | Percent increment | Vehicles per 1000 Population |
|---------|---------------------------|-------------------------------|-------------------|------------------------------|
| 1989/90 | 76378 | 76378 | | 4 |
| 1990/91 | 11524 | 87902 | 13.11 | 5 |
| 1991/92 | 14467 | 102369 | 14.13 | 5 |
| 1992/93 | 12861 | 115230 | 11.16 | 6 |
| 1993/94 | 16609 | 131839 | 12.60 | 7 |
| 1994/95 | 17414 | 149253 | 11.67 | 7 |
| 1995/96 | 23193 | 172446 | 13.45 | 8 |
| 1996/97 | 19110 | 191556 | 9.98 | 9 |
| 1997/98 | 20425 | 211981 | 9.64 | 10 |
| 1998/99 | 24139 | 236120 | 10.22 | 11 |
| 1999/00 | 28280 | 264400 | 10.70 | 12 |
| 2000/01 | 40995 | 305395 | 13.42 | 13 |
| 2001/02 | 49560 | 354955 | 13.96 | 15 |
| 2002/03 | 37610 | 392565 | 9.58 | 16 |
| 2003/04 | 39699 | 432264 | 9.18 | 17 |
| 2004/05 | 40531 | 472795 | 8.57 | 19 |
| 2005/06 | 55775 | 528570 | 10.55 | 20 |
| 2006/07 | 88735 | 617305 | 16.79 | 23 |
| 2007/08 | 85739 | 703044 | 13.90 | 27 |

Source : Department of Transport Management.

Table 9.17 : Types and Length of Road, 1995/96 - 2003/04

| Year | Type of Road | | | | Pop ⁿ in '000' | Pop ⁿ per km. Road |
|---------|--------------|----------|---------|-------|---------------------------|-------------------------------|
| | Black Topped | Graveled | Earthen | Total | | |
| 1995/96 | 3609 | 2867 | 4761 | 11237 | 20530 | 1827 |
| 1996/97 | 3655 | 3011 | 5048 | 11714 | 21020 | 1794 |
| 1997/98 | 4080 | 3489 | 5654 | 13223 | 21530 | 1628 |
| 1998/99 | 4148 | 3710 | 5851 | 13709 | 22040 | 1608 |
| 1999/00 | 4522 | 3646 | 7140 | 15308 | 22570 | 1474 |
| 2000/01 | 4566 | 3786 | 7350 | 15702 | 23150 | 1474 |
| 2001/02 | 4781 | 4520 | 7533 | 16834 | 23670 | 1406 |
| 2002/03 | 4811 | 4595 | 7541 | 16947 | 24200 | 1428 |
| 2003/04 | 4871 | 4697 | 7614 | 17182 | 24740 | 1440 |
| 2004/05 | 4911 | 4707 | 7661 | 17279 | 25300 | 1464 |
| 2005/06 | 5048 | 4727 | 7658 | 17433 | 25860 | 1483 |
| 2006/07 | 5402 | 4529 | 7851 | 17782 | 26440 | 1487 |
| 2007/08 | 5710 | 4686 | 8431 | 18828 | 26900 | 1428 |

Source : Department of Roads.

Table 9.18 : Number of Refugees, 2002 - 2007

| Refugee | Number | | | 2007 | Change in % | | |
|-------------------|---------------|---------------|---------------|--------|-------------|-------------|------|
| | 2002 | 2003 | 2004 | | 2003 | 2004 | 2007 |
| Bhutanese Refugee | 102263 | 102821 | 104912 | 109156 | 0.55 | 2.03 | 4.04 |
| Tibetan Refugee | 12540* | 12540* | 20000** | NA | 0 | 59.49 | |
| Total | 114803 | 115361 | 124912 | | 0.49 | 8.28 | |

*Recorded in 1993; **Estimated.

Source : Ministry of Home Affairs.

Table 9.19 : Urban Road and Sewerage by Municipality, 2004

(length in km)

| Municipality | Length of Road within Municipality | | | | Sewerage within Municipality | | | |
|--------------------------|------------------------------------|----------|---------|--------|------------------------------|----------------|------|-------|
| | Black Topped | Graveled | Earthen | Total | Major Sewerage | Minor Sewerage | Nali | Total |
| Amargadhi | 27 | 2 | 25 | 54 | NA | NA | 0.2 | 0.2 |
| Baglung | 9.1 | 5.7 | 50.9 | 65.7 | NA | NA | 13.9 | 13.9 |
| Banepa | 8.3 | 8.82 | 16.7 | 33.84 | 8.75 | 3.3 | 1 | 13 |
| Bhadrapur | 25.52 | 11.52 | 6.46 | 43.5 | 1.8 | 2.3 | 0 | 4.1 |
| Bhaktapur | 10.6 | 24.29 | 6 | 40.89 | NA | 30 | 0 | 30 |
| Bharatpur | 19 | 150 | 15 | 184 | 3 | 15 | 17 | 35 |
| Bhimeswor | 32.5 | 4 | 4 | 40.5 | NA | 0.5 | 33 | 33.5 |
| Bidur | 18 | 23.4 | 26 | 67.4 | 7.8 | 0 | 0 | 7.8 |
| Biratnagar Sub Met. City | 120 | 200 | 400 | 720 | 10 | 18 | 32 | 60 |
| Birendranagar | 6 | 50 | 20.1 | 76.1 | NA | NA | NA | NA |
| Birganj Sub Me. City | 115.05 | 83.56 | 82.2 | 280.79 | 4.7 | 41 | NA | 45.24 |
| Butawal | 14 | 18.4 | 49.3 | 81.7 | 1.2 | 1.5 | 3 | 5.7 |
| Byas | 8.34 | 11.66 | 110 | 130 | 0.9 | 2.9 | 0 | 3.8 |
| Damak | 34 | 250 | 350 | 634 | 3.5 | 2.5 | 15 | 21 |
| Dasharathchanda | NA | NA | 34.5 | 34.5 | NA | NA | NA | NA |
| Dhangadhi | 21 | 115 | 182 | 318 | 9 | NA | NA | 9 |
| Dhankuta | 22.93 | 7.34 | 27.3 | 57.61 | 24 | | | 24 |
| Dharan | 65 | 11 | 116 | 192 | 25 | 20 | 0 | 45 |
| Dhulikhel | 15 | 10 | 10 | 35 | NA | NA | 0.8 | 0.8 |
| Dipayal Silgadhi | 14.02 | 3 | 19 | 36.02 | 3.25 | 1.9 | 0 | 5.11 |
| Gaur | 15 | 24 | 134 | 173 | 0.12 | NA | NA | 0.12 |
| Guleriya | 4 | 12 | 30 | 46 | 0 | 0 | 5 | 5 |
| Hetauda | 56.2 | 50.83 | 29 | 136.03 | 24.12 | 1.2 | NA | 25.27 |
| Ilam | 20 | 12 | 50 | 82 | 15 | 2 | 2 | 19 |
| Inaruwa | 11.05 | 40.48 | 20.9 | 72.43 | 3.21 | 0 | 0 | 3.21 |
| Itahari | 16 | 151 | 172 | 339 | 3 | 4 | 15 | 22 |
| Jaleshwor | 6.01 | 14.69 | 15.1 | 35.8 | NA | NA | 3.19 | 3.19 |
| Janakpur | 30 | 55 | 60 | 145 | 4 | 10 | 100 | 114 |
| Kalaiya | 14 | 18.4 | 49.3 | 81.7 | 1.2 | 1.5 | 3 | 5.7 |
| Kamalamai | NA | NA | 33 | 33 | NA | NA | NA | NA |
| Kapilbastu | 4.5 | 25 | 25 | 54.5 | 3 | 0 | 0 | 3 |
| Kathmandu Met. City | 481 | 203 | 44 | 728 | 2819 | 20 | 407 | 3246 |
| Khadbari | 35 | 40 | 30 | 105 | 35 | 40 | 30 | 105 |
| Kirtipur | 8 | 18 | 30 | 56 | 4 | 15 | NA | 19 |
| Lahan | 7.5 | 16.25 | 10 | 33.75 | 3.3 | 1 | 0 | 4.3 |
| Lalitpur Sub Met. City | 34.54 | 17.4 | | 51.94 | NA | NA | NA | NA |
| Lekhath | 20.5 | 49.75 | 59 | 129.25 | NA | NA | NA | 0 |
| Madhyapur Thimi | 20 | 12 | 16 | 48 | 10 | 16 | 0 | 26 |
| Mahendranagar | 10.5 | 56 | NA | 66.5 | 3.5 | 4.5 | NA | 8 |
| Malangawa | 6 | 14 | 22 | 42 | 6 | 2 | 3.2 | 11.2 |
| Mechinagar | 14.82 | 142.26 | 61.5 | 218.54 | NA | NA | 10.4 | 10.38 |
| Narayan | NA | NA | 37.3 | 37.3 | NA | 0.5 | NA | 0.471 |
| Nepalgunj | 18.65 | 26.45 | 38.5 | 83.6 | NA | NA | 10 | 10 |
| Panauti | 125.2 | 35 | 125 | 285.2 | 42 | 15 | 20 | 77 |
| Pokhara Sub Met. City | 13.26 | 10.95 | 96.3 | 120.51 | NA | NA | NA | NA |
| Prithbinarayan | 22 | 16 | 28 | 66 | 1.2 | | 32 | 33.2 |
| Putalibazar | 28 | 7.1 | 37.3 | 72.35 | 0 | 0 | 27.4 | 27.43 |

Table 9.19 : Urban Road and Sewerage by Municipality, 2004 (contd...)

(length in km)

| Municipality | Length of Road within Municipality | | | | Sewerage within Municipality | | | |
|-----------------|------------------------------------|----------|---------|--------|------------------------------|----------------|------|-------|
| | Black Topped | Graveled | Earthen | Total | Major Sewerage | Minor Sewerage | Nali | Total |
| Rajbiraj | 6.05 | 8.75 | 8.75 | 23.55 | 2.5 | 2 | 1.5 | 6 |
| Ramgram | 1 | 20 | 39 | 60 | 0.3 | 0.4 | 1.7 | 2.4 |
| Ratnanagar | 32 | 70 | 15 | 117 | NA | NA | 6.5 | 6.5 |
| Siddharthanagar | 32 | 65 | 10 | 107 | 2 | 18 | | 20 |
| Siraha | 5 | 10 | 24 | 39 | NA | NA | 0.5 | 0.5 |
| Tansen | 21 | 6.69 | 543 | 570.81 | 1.8 | 2.5 | | 4.3 |
| Tikapur | 1.5 | 69.85 | 142 | 143 | 2.75 | 2.5 | NA | 5.25 |
| Tribhuvan Nagar | 24.2 | 230.45 | 87.3 | 341.97 | 3.4 | 4.5 | 2 | 9.9 |
| Triyuga | 19 | 34 | 200 | 253 | 1 | 12 | 5 | 18 |
| Tulsipur | 12 | 25 | 35 | 72 | 2.5 | NA | NA | 2.5 |
| Waling | 9.3 | 4 | 70 | 83.3 | NA | NA | 10 | 10 |

Source : Ministry of Local Development (Short Glimpse of Municipalities – 2004).

Table 9.20 : Nepal National Building Code, 2060

| S. No. | Building Code No | Contents | Remarks |
|--------|------------------|---|--|
| 1 | NBC 000 | Requirements for State of the Art Design: An Introduction | Building for Foreign Donor Organizations |
| 2 | NBC 001 | Materials Specifications | > 1000 sq.ft plinth area and more than 3 flats. Building designer and monitoring by Architecture Engineer |
| 3 | NBC 002 | Unit Weight of Materials | |
| 4 | NBC 003 | Occupancy Load (Imposed Load) | |
| 5 | NBC 004 | Wind Load | |
| 6 | NBC 005 | Seismic Design of Building | |
| 7 | NBC 006 | Snow Load | |
| 8 | NBC 007 | Provisional Recommendation on First Safety | |
| 9 | NBC 008 | Site Consideration for Seismic Hazards | |
| 10 | NBC 009 | Masonry : Unreinforced | |
| 11 | NBC 010 | Plain and Reinforced Concrete | |
| 12 | NBC 011 | Steel | |
| 13 | NBC 012 | Timber | |
| 14 | NBC 013 | Aluminum | |
| 15 | NBC 014 | Construction Safety | |
| 16 | NBC 201 | Mandatory Rule of Timber : Reinforced Concrete Buildings with Masonry Infill | < 1000 sq. ft plinth area and less than 3 flats. Building designer and monitoring by Architecture Sub-Engineer |
| 17 | NBC 202 | Mandatory Rule of Timber : Load Bearing Masonry | |
| 18 | NBC 203 | Guidelines for Earthquake Resident Building Construction : Low Strength Masonry | |
| 19 | NBC 204 | Guidelines for Earthquake Resident Building Construction : Earthen Building (EB) | |
| 20 | NBC 205 | Mandatory Rule of Thumb : Reinforced Concrete Buildings without Masonry Infill | |
| 21 | NBC 206 | Architectural Design Requirements | > 1000 sq.ft plinth area and more than 3 flats. Building designer and monitoring by Architecture Engineer |
| 22 | NBC 207 | Electrical Design Requirements for (public Buildings) | |
| 23 | NBC 208 | Sanitary and Plumbing Design Requirements | |

Source : Department of Housing and Urban Development.

Chapter X

Natural Disaster and Miscellaneous

Table 10.1 : Earthquake by Epicenter and Magnitude, 2005 - 2008

| Date | Latitude | Longitude | Epicenter (Village / District) | Local Magnitude (ml) | Remarks |
|------------|----------|-----------|--|-------------------------|---------|
| 07/02/05 | 30.10 | 81.05 | Api Himal/Darchula | 4.2 | NSC |
| 07/02/06 | 28.35 | 83.43 | Darwan/Myagdi | 4.1 | NSC |
| 07/02/06 | 28.36 | 83.43 | Darwan/Myagdi | 4.2 | NSC |
| 07/02/15 | 29.83 | 81.45 | South of Saipal/Bajhang | 5 | NSC |
| 07/03/10 | 29.47 | 81.73 | Kalukheti/Bajhang | 4.5 | NSC |
| 07/05/16 | 27.5 | 88.08 | Nepal/India Border | 4.6 | NSC |
| 07/06/04 | 27.44 | 83.98 | Nepal/India Border | 4.2 | NSC |
| 07/06/17 | 27.83 | 84.91 | Dhading | 4.3 | NSC |
| 07/07/07 | 28.08 | 85.30 | Sarsin/Rasua | 4 | NSC |
| 07/07/30 | 27.27 | 87.02 | Dana/Bhojpur | 4.1 | NSC |
| 07/08/01 | 29.49 | 81.91 | Mugu | 4.6 | NSC |
| 07/08/03 | 27.24 | 87.03 | Bhojpur | 4.5 | NSC |
| 07/08/03 | 27.2 | 87.04 | Bhojpur | 4.3 | NSC |
| 07/08/03 | 27.24 | 87.02 | Bhojpur | 4 | NSC |
| 07/08/03 | 27.21 | 87.97 | Pranbun/Panchthar | 4.4 | NSC |
| 07/08/06 | 27.84 | 85.69 | Syaule/Sindhupalchok | 4.1 | NSC |
| 07/08/11 | 27.28 | 87.9 | Taplejung | 5.2 | NSC |
| 07/09/07 | 28.05 | 85.33 | Sarsing/Rasuwa | 4.2 | NSC |
| 07/09/07 | 27.72 | 86.26 | Jugu/Dolakha | 4.1 | NSC |
| 07/10/12 | 27.75 | 86.12 | Dolakha | 4 | NSC |
| 07/10/29 | 27.9 | 85.45 | Saramthali/Nuwakot | 5 | NSC |
| 07/11/05 | 28.2 | 84.45 | Duradanda/Lamjung | 4.5 | NSC |
| 07/12/01 | 28.05 | 85.28 | Sarsin/Rasuwa | 4.1 | NSC |
| 08/02/14 | 27.8 | 88.15 | Taplejung | 4.1 | NSC |
| 08/02/16 | 26.8 | 86.25 | Mirchaiya/Siraha | 4.2 | NSC |
| 08/03/02 | 29.69 | 81.76 | Bhargaun/Border of Bajura, Humla and Mugu | 4.4 | NSC |
| 08/01/15 | 27.37 | 86.53 | Okhaldhunga | 4.1 | NSC |
| 2008/02/08 | 29.73 | 81.55 | Jethibahurani, Bajura | 4.4 | |
| 2008/10/9 | 28.4 | 83.01 | Balkot, Baglung | 4.1 | |
| 2008/07/10 | 27.47 | 87.71 | Pathivara, Taplejung | 4.5 | |

NSC: Earthquake reported by the National Seismological Centre (NSC), Kathmandu.

Source: Department of Mines and Geology (www.seismonepal.gov.np).

Table 10.2 : Loss of Lives, Livestocks and Other Effects by Type of Disaster
(Disasters: Flood, Cold, Landslide, Avalanches, Earthquake, Fire, Epidemic, Windstorm, Hailstone & Thunderbolt)

| Year | Number of People | | | Number of Livestock Lost | Number of House Destroyed | Number of Affected Family | Land Area Affected (Ha) | Estimated Loss (Million NRs) |
|------|------------------|---------|---------|--------------------------|---------------------------|---------------------------|-------------------------|------------------------------|
| | Dead | Missing | Injured | | | | | |
| 1983 | 579 | | NA | 248 | 12 | NA | NA | 240 |
| 1984 | 941 | | NA | 3547 | 10597 | NA | 1242 | 49 |
| 1985 | 1387 | | NA | 3399 | 7166 | NA | 1355 | 23 |
| 1986 | 1512 | | NA | 6566 | 3370 | NA | 1315 | 23 |
| 1987 | 881 | | 162 | 1852 | 36220 | 97036 | 18858 | 2005 |
| 1988 | 1584 | | 12538 | 2788 | 108801 | 70197 | NA | 6099 |
| 1989 | 1716 | | 3014 | 2440 | 7648 | NA | NA | 4172 |
| 1990 | 913 | | 196 | 867 | 6352 | 8462 | 1132 | 139 |
| 1991 | 971 | | 43 | 642 | 5510 | 6426 | 283 | 43 |
| 1992 | 1318 | | 17 | 1586 | 13997 | 11535 | 135 | 52 |
| 1993 | 1524 | | 246 | NA | 21911 | 90911 | NA | 5189 |
| 1994 | 765 | | 155 | 1329 | 3234 | 11701 | 392 | 184 |
| 1995 | 873 | | 1937 | 2053 | 10275 | 134216 | 41867.26 | 1933 |
| 1996 | 895 | | 1527 | 2480 | 30014 | 58329 | 6063.4 | 1579 |
| 1997 | 1160 | | 1120 | 1191 | 4825 | 46054 | 6063.4 | 410 |
| 1998 | 1190 | | 117 | 1179 | 15082 | 36987 | 326.89 | 1230 |
| 1999 | 1466 | | 146 | 65 | 4304 | 17842 | 182.4 | 509 |
| 2000 | 377 | | 162 | 1017 | 6886 | 24900 | 889 | 1142 |
| 2001 | 415 | | 132 | 665 | 6103 | 15908 | NA | 527 |
| 2002 | 458 | | 287 | 2126 | 19856 | 40935 | 10078 | 526 |
| 2003 | 310 | | 160 | 1125 | 6819 | 11730 | 2360 | 990 |
| 2004 | 192+30 | | 220 | 888 | 4818 | 16997 | 0 | 341.09 |
| 2005 | 242+26 | 20 | 153 | 955 | 3169 | 4315 | 0 | 387.22 |
| 2006 | 131+30 | 30 | 88 | 10098 | 3765 | 19023 | 3396.84 | 392.31 |
| 2007 | 274 | 192 | 144 | 21861 | 10681 | 117203 | 514 | 1928 |

Source: Ministry of Home Affairs and Department of Water Induced Disaster Prevention (Disaster Review).

Table 10.3 : Loss of Lives and Frequency by Type of Disaster, 1983 - 2007

| Year | Flood & Landslide | Earth-quake | Windstorms, Hailstorm & Thunderbolts | Avalanche | Fire | Cold | Heat | Epidemics | Total |
|------|-------------------|-------------|--------------------------------------|-----------|------|------|------|-----------|-------|
| 1983 | 293 | | NA | | 69 | | | 217 | 579 |
| 1984 | 363 | | NA | | 57 | | | 521 | 941 |
| 1985 | 420 | | NA | | 52 | | | 915 | 1387 |
| 1986 | 315 | | NA | | 96 | | | 1101 | 1512 |
| 1987 | 391 | | 2 | | 62 | | | 426 | 881 |
| 1988 | 328 | 721 | NA | 14 | 23 | | | 427 | 1513 |
| 1989 | 680 | | 28 | 20 | 109 | | | 879 | 1688 |
| 1990 | 307 | | 57 | | 46 | | | 503 | 913 |
| 1991 | 93 | | 63 | | 90 | | | 725 | 971 |
| 1992 | 71 | 2 | 20 | | 97 | | | 1128 | 1318 |
| 1993 | 1336 | | 45 | | 43 | | | 100 | 1524 |
| 1994 | 49 | | 47 | | 43 | | | 626 | 765 |
| 1995 | 203 | | 34 | 43 | 73 | | | 520 | 873 |
| 1996 | 258 | 3 | 75 | 4 | 61 | | | 494 | 895 |
| 1997 | 83 | | 49 | 12 | 65 | | | 951 | 1160 |
| 1998 | 273 | | 23 | | 54 | | | 840 | 1190 |
| 1999 | 193 | | 22 | 5 | 39 | | | 1207 | 1466 |
| 2000 | 173 | | 26 | | 37 | | | 141 | 377 |
| 2001 | 196 | 1 | 38 | | 26 | | | 154 | 415 |
| 2002 | 441 | 0 | 6 | | 11 | | | 0 | 458 |
| 2003 | 232 | 0 | 62 | | 16 | | | 0 | 310 |
| 2004 | 131 | 0 | 10 | | 10 | 9 | 20 | 41 | 222 |
| 2005 | 141 | 0 | 18 | 21 | 28 | 10 | 80 | 34 | 290 |
| 2006 | 114 | 0 | 15 | 0 | 3 | NA | NA | NA | |
| 2007 | 216 | 0 | 40 | 6 | 9 | 18 | 60 | 3 | 323 |

Source: Ministry of Home Affairs and Department of Water Induced Disaster Prevention (Disaster Review), Department of Health Services (Health Report).

Table 10.4 : Infection Cases by Disease

| Infection Diseases | Year | | | | | |
|-------------------------------------|--------|--------|--------|---------|--------|--------|
| | 2000 | 2001 | 2002 | 2003/04 | 2005 | 2006 |
| Malaria | | | | | | |
| Total Slide Examination | 103298 | 113907 | 113403 | 148144 | 170988 | 137444 |
| Total Positive | 9313 | 6188 | 10446 | 6365 | 5691 | 5293 |
| Kala-azar | | | | | | |
| Number of Patient | - | 1290 | 832 | 1049 | 1190 | 1531 |
| Death due to Kala-azar | - | 23 | 12 | 8 | 15 | 14 |
| Tuberculosis | | | | | | |
| Population of New Positive Case (%) | - | 13714 | 13342 | 14614 | 16075 | 14353 |
| Treatment Success (Percent) | - | 89 | 90 | 85 | 87 | 89 |

Table 10.4 : Infection Cases by Disease (contd...)

| Infection Diseases | Year | | | | | |
|--|------|------|------|---------|-------|-------|
| | 2000 | 2001 | 2002 | 2003/04 | 2005 | 2006 |
| Leprosy | | | | | | |
| New Case Detection Rate/10,000 | - | 5.73 | 3.24 | 2.84 | NA | 1.65 |
| Prevalence Rate/10,000 | - | 4.41 | 3.04 | 2.41 | 1.96 | 1.45 |
| HIV/AIDS and STD | 222 | 324 | 467 | 714 | 19849 | 11201 |
| Male | 301 | 264 | 360 | 505 | NA | |
| Female | 95 | 60 | 107 | 209 | NA | |
| Other Transmitting Diseases | | | | | | |
| ARI (Dead Case) | | | 278 | 281 | 288 | 252 |
| Chronic Diarrhea Diseases (CDD) (per 1000<5 pop ⁿ) | | | 148 | 194 | 218 | 185 |

Source: Department of Health Services (Annual Report).

Table 10.5 : Most Specific and Non-specific Disease Report, 2007

(Number of affected)

| Diseases | Cattle | Buffalo | Goat | Sheep | Pig | Poultry |
|--|--------|---------|--------|-------|-------|---------|
| Diarrhoea | 36365 | 36233 | 53162 | 4207 | 3794 | 69174 |
| External parasites | 22301 | 18299 | 70496 | 10028 | | 21252 |
| Foot and mouth disease | 6744 | 20722 | - | - | 106 | - |
| Infertility | 13877 | 14606 | 6634 | - | - | - |
| Liver fluke/Fasciolosis/ Distomatosis | 109953 | 115803 | 108436 | 17610 | - | - |
| Paramphistomosis | 32440 | 38476 | 17480 | - | - | - |
| Parasitic gastroenteritis | 30514 | 32293 | 78085 | 6299 | 13194 | - |
| Mange | - | - | 27931 | 7207 | 1827 | - |
| Respiratory sign/disease | 10249 | 8159 | 17470 | 1851 | 1203 | 37600 |
| Skin lesion | 5910 | 6579 | 11577 | 2338 | 1773 | - |
| Wound | 13469 | 11888 | 13810 | 2227 | 755 | - |
| Tympany | - | - | - | 1033 | - | - |
| Enterotoxaemia | - | - | - | 533 | - | - |
| Cough | - | - | - | - | 378 | - |
| Coccidiosis | - | - | - | - | 400 | 69174 |
| Fowlpox | - | - | - | - | - | 9852 |
| Intestinal helminthiasis | - | - | - | - | - | 59826 |
| Marek's disease | - | - | - | - | - | 48800 |
| Pullorum disease | - | - | - | - | - | 13675 |
| Gumboro disease | - | - | - | - | - | 73532 |

Source: Department of Livestock Services (Agricultural Statistics, MOAC).

**Table 10.6 : Number of Environment Related NGOs and INGOs Affiliated
with Social Welfare Council**

| Dis. Code | Name of District | NGOs | | | INGOs | | | Dis. Code | Name of District | NGOs | | | INGOs | | |
|--------------|---------------------|---------|---------|---------|---------|---------|---------|--------------|---------------------|------------|-------------|-------------|----------|----------|----------|
| | | 2003/04 | 2004/05 | 2007/08 | 2003/04 | 2004/05 | 2006/07 | | | 2003/4 | 2004/5 | 2007/08 | 2003/4 | 2004/5 | 2006/07 |
| 1 | Taplejung | 3 | 3 | 4 | | | | 39 | Syangja | 6 | 6 | 6 | | | |
| 2 | Panchthar | 8 | 9 | 4 | | | | 40 | Kaski | 29 | 35 | 40 | | | |
| 3 | Ilam | 5 | 5 | 6 | | | | 41 | Manang | 0 | 0 | 0 | | | |
| 4 | Jhapa | 14 | 16 | 16 | | | | 42 | Mustang | 0 | 1 | 1 | | | |
| 5 | Morang | 16 | 18 | 17 | | | | 43 | Myagdi | 2 | 2 | 3 | | | |
| 6 | Sunsari | 15 | 15 | 18 | | | | 44 | Parbat | 7 | 8 | 8 | | | |
| 7 | Dhankuta | 1 | 1 | 2 | | | | 45 | Baglung | 4 | 4 | 4 | | | |
| 8 | Terhathum | 1 | 2 | 3 | | | | 46 | Gulmi | 6 | 6 | 6 | | | |
| 9 | Sankhuwasabha | 1 | 1 | 1 | | | | 47 | Palpa | 8 | 9 | 11 | | | |
| 10 | Bhojpur | 2 | 2 | 2 | | | | 48 | Nawalparasi | 10 | 12 | 13 | | | |
| 11 | Solukhumbu | 2 | 2 | 3 | | | | 49 | Rupandehi | 2 | 3 | 18 | | | |
| 12 | Okhaldhunga | 3 | 3 | 3 | | | | 50 | Kapilbastu | 6 | 7 | 8 | | | |
| 13 | Khotang | 2 | 2 | 2 | | | | 51 | Arghakhanchi | 2 | 2 | 5 | | | |
| 14 | Udayapur | 1 | 2 | 4 | | | | 52 | Pyuthan | 2 | 2 | 2 | | | |
| 15 | Saptari | 14 | 14 | 14 | | | | 53 | Rolpa | 1 | 1 | 2 | | | |
| 16 | Siraha | 7 | 9 | 11 | | | | 54 | Rukum | 0 | 0 | 1 | | | |
| 17 | Dhanusa | 8 | 9 | 12 | | | | 55 | Salyan | 8 | 8 | 9 | | | |
| 18 | Mahottari | 6 | 7 | 9 | | | | 56 | Dang | 16 | 18 | 21 | | | |
| 19 | Sarlahi | 3 | 4 | 6 | | | | 57 | Banke | 15 | 18 | 19 | | | |
| 20 | Sindhuli | 19 | 20 | 11 | | | | 58 | Bardiya | 18 | 18 | 28 | | | |
| 21 | Ramechhap | 3 | 3 | 4 | | | | 59 | Surkhet | 21 | 23 | 13 | | | |
| 22 | Dolakha | 10 | 11 | 10 | | | | 60 | Dailekh | 3 | 3 | 6 | | | |
| 23 | Sindhupalchok | 10 | 12 | 9 | | | | 61 | Jajarkot | 1 | 1 | 1 | | | |
| 24 | Kavre | 7 | 9 | 14 | | | | 62 | Dolpa | 3 | 4 | 4 | | | |
| 25 | Lalitpur | 35 | 38 | 61 | | | | 63 | Jumla | 1 | 1 | 1 | | | |
| 26 | Bhaktapur | 7 | 7 | 8 | | | | 64 | Kalikot | 7 | 8 | 8 | | | |
| 27 | Kathmandu | 391 | 429 | 481 | 3 | 3 | 3 | 65 | Mugu | 2 | 2 | 7 | | | |
| 28 | Nuwakot | 4 | 5 | 5 | | | | 66 | Humla | 2 | 2 | 2 | | | |
| 29 | Rasuwa | 1 | 1 | 1 | | | | 67 | Bajura | 2 | 2 | 3 | | | |
| 30 | Dhading | 9 | 10 | 11 | | | | 68 | Bajhang | 3 | 5 | 7 | | | |
| 31 | Makwanpur | 12 | 13 | 15 | | | | 69 | Achham | 4 | 5 | 8 | | | |
| 32 | Rautahat | 2 | 6 | 10 | | | | 70 | Doti | 5 | 5 | 6 | | | |
| 33 | Bara | 6 | 9 | 10 | | | | 71 | Kailali | 15 | 16 | 21 | | | |
| 34 | Parsa | 6 | 8 | 8 | | | | 72 | Kanchanpur | 12 | 16 | 23 | | | |
| 35 | Chitawan | 37 | 41 | 41 | | | | 73 | Dadeldhura | 3 | 3 | 5 | | | |
| 36 | Gorkha | 9 | 10 | 11 | | | | 74 | Baitadi | 2 | 2 | 5 | | | |
| 37 | Lamjung | 10 | 11 | 13 | | | | 75 | Darchaula | 1 | 3 | 4 | | | |
| 38 | Tanahu | 7 | 7 | 7 | | | | | Total | 926 | 1035 | 1067 | 3 | 3 | 3 |

Source: Social Welfare Council.

Appendices

List of Environment Related Policies, Acts and Rules

A. Instruments Having Environment Friendly Policies

- 1 Interim Constitution of Nepal, 2007 (2063)
 - 2 National Conservation Strategy, 2044 (1988)
 - 3 Nepal Environmental Policy and Action Plan Part I, 2050 (1993) and Part II (1998)
 - 4 Wildlife Protection and Research Policy, 2060 (2004)
 - 5 Tenth Plan 2000/01
 - 6 Three Years Interim Plan (2007/08 - 2009/10)
-

B. Acts Having Environment Friendly Provisions

- 1 Ancient Monuments Protection Act, 1956
 - 2 Civil Aviation Act, 1958
 - 3 Aquatic Animals Protection Act, 1960
 - 4 Plant Protection Act, 1964
 - 5 National Parks & Wildlife Conservation Act, 1973
 - 6 Public Road Act, 1974
 - 7 Trust Corporation Act, 1976
 - 8 Tourism Act, 1978
 - 9 Nature Conservation Trust Act, 1982
 - 10 Soil & Watershed Conservation Act, 1982
 - 11 Nepal Petroleum Act, 1983
 - 12 Nepal Electricity Authority Act, 1984
 - 13 Mines & Mineral Act, 1985
 - 14 Pashupati Area Development Trust Act, 1987
 - 15 Solid Waste (Management & Resource Mobilization) Act, 1987
 - 16 Town Development Act, 1988
 - 17 Kathmandu Valley Development Authority Act, 1988
 - 18 Nepal Water Supply Corporation Act, 1989
 - 19 Pesticides Act, 1991
 - 20 Local Self-government Act, 1998
 - 21 Water Resources Act, 1992
 - 22 Forest Act, 1993
 - 23 Electricity Act, 1992
 - 24 Vehicle & Transportation Management Act, 1992
 - 25 Labour Act, 1992
 - 26 Industrial Enterprises Act, 1992
 - 27 Nepal Tourism Board Act, 1996
 - 28 Environment Protection Act, 1996
-

C. Rules

- 1 National Parks & Wildlife Conservation Rules, 1973
- 2 Plant Protection Rules, 1974
- 3 Wildlife Reserve Rules, 1977
- 4 Himalayan National Park Rules, 1979
- 5 Mountaineering Rules, 1979
- 6 Nature Conservation Trust Rules, 1984
- 7 Petroleum Rules, 1984
- 8 Khaptad National Park Rules, 1987
- 9 Ancient Monuments Protection Rules, 1989
- 10 Solid Waste (Management & Resource Mobilization) Rules, 1989
- 11 Water Resources Rules, 1993
- 12 Pesticides Rules, 1993
- 13 Labour Rules, 1993
- 14 Electricity Rules, 1993
- 15 Forest Rules, 1995
- 16 Buffer Zone Management Rules, 1995
- 17 Bardiya National Park Rules, 1996
- 18 Conservation Area Management Rules, 1996
- 19 Vehicle & Transportation Management Rules, 1997
- 20 Environment Protection Rules, 1997
- 21 Labour Rules, 1993
- 22 Local Self-government Rules 1999

Source : Ministry of Population and Environment (State of the Environment, Nepal, 2001).

Integrated Environmental and Economic Accounting 2003 (SEEA 2003)

SEEA 2003 is a satellite system of the System of National Accounts that brings together economic and environmental information in a common framework to measure the contribution of the environment to the economy and the impact of the economy on the environment. It provides policy-makers with indicators and descriptive statistics to monitor these interactions as well as a database for strategic planning and policy analysis to identify more sustainable paths of development.

The SEEA 2003 comprises four categories of accounts:

- *Flow accounts for pollution, energy and materials* (Chapters 3 and 4). These accounts provide information at the industry level about the use of energy and materials as inputs to production and the generation of pollutants and solid waste.
- *Environmental protection and resource management expenditure accounts* (Chapters 5 and 6). These accounts identify expenditures incurred by industry, government and households to protect the environment or to manage natural resources. They take those elements of the existing SNA which are relevant to the good management of the environment and show how the environment-related transactions can be made more explicit.
- *Natural resource asset accounts* (Chapters 7 and 8). These accounts record stocks and changes in stocks of natural resources such as land, fish, forest, water and minerals.
- *Valuation of non-market flow and environmentally adjusted aggregates* (Chapters 9 and 10). This component presents non-market valuation techniques and their applicability in answering specific policy questions. It discusses the calculation of several macroeconomic aggregates adjusted for depletion and degradation costs and their advantages and disadvantages. It also considers adjustments concerning the so-called defensive expenditures.

The revision was undertaken under the joint responsibility of the United Nations, Eurostat, IMF, OECD and the World Bank. Much of the work was done by the London Group on Environmental Accounting.

Source : United Nations, Statistics Division (*Handbook of National Accounting : Integrated Environmental and Economic Accounting 2003*).

List of Conventions Signed and/or Ratified by the Government of Nepal

| S. N. | Name of Convention | Date of Submission of Ratification/Accession | Entry into Force |
|---------------|--|--|------------------|
| 1 | UN Convention to Combat Desertification in those Countries Experiencing Serious Drought and / or Desertification Particularly in Africa, 1994 | 10 Sept, 1996 | 13 January, 1997 |
| 2 | UN Framework Convention on Climate Change, 1992 | 02 May, 1994 | 31 July, 1994 |
| 3 | Convention on Biodiversity May 22, 1992 Bio-safety Protocol | 23 Nov, 1993 | 21 Feb, 1994 |
| 4 | Agreement on the Network of Aquaculture Centers in Asia and the Pacific Region, 1988 | | 4 Jan. 1990 |
| 5 | Convention on Wetlands of International Importance especially as Waterfowl habitat, 1971 | 17 Dec, 1975 | 17 Apr, 1988 |
| 6 | Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 1973 | 18 June, 1975 | 16 Sept, 1975 |
| 7 | Plant Protection Agreement for the South East Asia and Pacific Region (as amended) 1956 | 12 Aug, 1965 | 12 Aug, 1965 |
| 8 | Convention on the High Seas, 1958 | 28 Dec, 1962 | 27 Jan, 1963 |
| 9 | Treaty Banning Nuclear Weapon Test in the Atmosphere, in outer Space and Sea-bed 1963 | 7 Oct, 1964 | 7 Oct, 1964 |
| 10 | Treaty on Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass destruction on the Sea-bed and the Ocean Floor and in the Subsoil Thereof 1971 | 6 July, 1971 | 18 May, 1972 |
| 11 | Convention for the Protection of the World Cultural and Natural Heritage, 1972 | 21 June, 1978 | 20 Sept, 1978 |
| 12 | International Agreement for Tropical Timber (ITTA), 1983 | | 3 Jul, 1990 |
| 13(a) | Vienna Convention for the Protection of the Ozone Layer, 1985 | 6 Apr, 1994 | 4 Oct, 1994 |
| 13(b) | Montreal Protocol Substances that Deplete the Ozone Layer (Montreal Protocol), 1987 | 6 July, 1994 | 4 Oct, 1994 |
| 13(c) | London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (London Agreement), 1990 | 06 July, 1994 | 4 Oct, 1994 |
| 14 | Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes (Basel Convention), 1989 | 15 Aug, 1996 | 13 January, 1997 |
| 15 | Treaty on Principles Governing the activities of State in the Exploration and Use of Outer Space including and Other the Moon Celestial Bodies, 1967 | | 10 Oct, 1967 |
| 16 | Kyoto Protocol | 16 Sept, 2005 | 14 Dec, 2005 |
| 17 | Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 | | 1 Jan, 1973 |
| 18 | Stockholm Convention on Persistent Organic Pollutants | 2006 | 2002 |
| 19 | Prior Informed Consent Convention | 2006 | 2002 |
| Signed | | | |
| 1 | Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological and Toxic Weapons and on their Destruction, 1972 | | 10 Apr, 1972 |
| 2 | United Nations on the Law of the Sea, 1982 | | 10 Dec, 1982 |
| 3 | Convention on Fishing and Convention of the Living Resources of the High Sea, 1958. | | 29 Apr, 1958 |
| 4 | Convention on the Continental Shelf, 1958. | | 29 Apr, 1958 |

Source: Ministry of Population and Environment (A journal of the Environment).

United Nations Environment Programme

The **UN Environment Programme (UNEP)** coordinates United Nations environmental activities, assisting developing countries in implementing environmentally sound policies and encourages sustainable development through sound environmental practices. It was founded as a result of the United Nations Conference on the Human Environment in June 1972 and has its headquarters in Nairobi, Kenya. UNEP also has six regional offices and various country offices.

UNEP is the designated authority of the United Nations system in environmental issues at the global and regional level. Its mandate is to coordinate the development of environmental policy consensus by keeping the global environment under review and bringing emerging issues to the attention of governments and the international community for action. The mandate and objectives of UNEP emanate from United Nations General Assembly resolution 2997 (XXVII) of 15 December 1972 and subsequent amendments adopted at UNCED in 1992, the Nairobi Declaration on the Role and Mandate of UNEP, adopted at the Nineteenth Session of the UNEP Governing Council, and the Malmö Ministerial Declaration of 31 May 2000.

Its activities cover a wide range of issues regarding the atmosphere, marine and terrestrial ecosystems. It has played a significant role in developing international environmental conventions, promoting environmental science and information and illustrating the way those can work in conjunction with policy, working on the development and implementation of policy with national governments and regional institution and working in conjunction with environmental Non-Governmental Organizations (NGOs). UNEP has also been active in funding and implementing environmentally related development projects.

UNEP has aided in the development of guidelines and treaties on issues such as the international trade in potentially harmful chemicals, transboundary air pollution, and contamination of international waterways.

The World Meteorological Organization and the UNEP established the Intergovernmental Panel on Climate Change (IPCC) in 1988. UNEP is also one of several Implementing Agencies for the Global Environment Facility (GEF).

Structure

UNEP's Governing Council consists of a total of 58 member states which serve three-year terms. These seats are allocated according to geographical regions. The Governing Council is the primary developer of policy guidelines for UN environmental programs and plays a diplomatic role in promoting cooperation between UN member states on environmental issues. The UNEP secretariat consists of 890 staff members, roughly 500 of which are international staff while the remaining are hired locally. The Secretariat is the body which oversees the implementation of UNEP policies and programs and is responsible for the annual budget which totals around \$105 million (US) and is almost entirely earned from member states. The implementation of UNEP's work is done by the following 7 Divisions:

- Early Warning and Assessment
- Environmental Policy Implementation
- Technology, Industry and Economics
- Regional Cooperation
- Environmental Law and Conventions
- Global Environment Facility Coordination
- Communications and Public Information

Executive Director

UNEP's current Executive Director is Achim Steiner, who succeeded previous director Klaus Töpfer in 2006. Dr Töpfer served two consecutive terms, beginning in February 1998. On 15 March 2006, the former Secretary-General of the United Nations, Kofi Annan (currently Ban Ki Moon), nominated Achim Steiner, former Director General of the IUCN to the position of Executive Director. One day later, the UN General Assembly followed Annan's proposal and elected him [2]. However, the nomination raised questions regarding conflict of interest after it was revealed that Steiner had (previous to his nomination by Annan) served as a judge on a panel that awarded the \$500,000 Dubai prize to Mr. Annan. The London-based *Financial Times* reported that the appointment "has prompted new questions about what standards should apply to senior U.N. officials to avoid conflicts of interest". The position was held for 17 years (1975-1992) by Dr. Mostafa Kamal Tolba, who was instrumental in bringing environmental considerations to the forefront of global thinking and action. Under his leadership, UNEP's most widely acclaimed success - the historic 1987 agreement to protect the ozone layer - the Montreal Protocol was negotiated.

During December 1972, the UN General Assembly unanimously elected Maurice Strong to head UNEP. Also Secretary General of both the 1972 United Nations Conference on the Human Environment, which launched the world environment movement, and the 1992 Earth Summit, Strong has played a critical role in globalizing the environmental movement.

International Years

The year 2007 was declared (International) Year of the Dolphin by the United Nations and UNEP. The UN Convention on Migratory Species, together with its specialized agreements on dolphin conservation ACCOBAMS and ASCOBANS and the WDCC (Whale and Dolphin Conservation Society) have proposed 2007 as the Year of the Dolphin ('YOD') (International) Patron of the Year of the Dolphin is H.S.H. Prince Albert II of Monaco, with Special Ambassador to the cause being Nick Carter, of The Backstreet Boys.^[2] (See international observance and list of environmental dates.)

Reports

UNEP publishes many reports, atlases and newsletters. For instance, the fourth Global Environment Outlook (GEO-4) assessment is a comprehensive report on environment, development and human well-being, providing analysis and information for policy makers and the concerned public. One of many points in the GEO-4 warns that we are living far beyond our means. It notes that the human population is now so large that the amount of resources needed to sustain it exceeds what is available. Humanity's environmental demand, or ecological footprint, is 21.9 hectares per person while the Earth's biological capacity is, on average, only 15.7 ha/person.

Famous World projects

UNEP has sponsored the development of solar loan programs, with attractive return rates, to buffer the initial deployment costs and entice consumers to consider and purchase solar PV systems. The most famous example is the solar loan program sponsored by UNEP helping 100,000 people finance solar power systems in India.^[4] Success in India's solar program has led to similar projects in other parts of developing world like Tunisia, Morocco, Indonesia and Mexico.

UNEP sponsors the Marshlands project in Middle East that helps to protect the largest marshland in Middle East. In 2001, UNEP alerted the international community to the destruction of the Marshlands when it released satellite images showing that 90 percent of the Marshlands had already been lost. The UNEP "support for Environmental Management of the Iraqi Marshland" commenced in August 2004, in order to manage the Marshland area in an environmentally sound manner.^[5]

Glaciers shrinking

Glaciers are shrinking at record rates and many could disappear within decades, the U.N. Environment Program said on March 16, 2008. The scientists measuring the health of almost 30 glaciers around the world found that ice loss reached record levels in 2006. On average, the glaciers shrank by 4.9 feet in 2006, the most recent year for which data are available. The most severe loss was recorded at Norway's Breidalblikkbrea glacier, which shrank 10.2 feet in 2006. Glaciers lost an average of about a foot of ice a year between 1980 and 1999. But since the turn of the millennium the average loss has increased to about 20 inches

Rio Declaration on Environment and Development (Agenda 21)

The United Nations Conference on Environment and Development, Having met at Rio de Janeiro from 3 to 14 June 1992,

Reaffirming the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 1972, a/ and seeking to build upon it,

With the goal of establishing a new and equitable global partnership through the creation of new levels of cooperation among States, key sectors of societies and people,

Working towards international agreements which respect the interests of all and protect the integrity of the global environmental and developmental system,

Recognizing the integral and interdependent nature of the Earth, our home,

Proclaims that:

Principle 1

Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

Principle 2

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Principle 3

The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

Principle 4

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

Principle 5

All States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world.

Principle 6

The special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries.

Principle 7

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

Principle 8

To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

Principle 9

States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.

Principle 10

Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

Principle 11

States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.

Principle 12

States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation. Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing transboundary or global environmental problems should, as far as possible, be based on an international consensus.

Principle 13

States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.

Principle 14

States should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.

Principle 15

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Principle 16

National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.

Principle 17

Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.

Principle 18

States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted.

Principle 19

States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith.

Principle 20

Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development.

Principle 21

The creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all.

Principle 22

Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

Principle 23

The environment and natural resources of people under oppression, domination and occupation shall be protected.

Principle 24

Warfare is inherently destructive of sustainable development. States shall therefore respect international law providing protection for the environment in times of armed conflict and cooperate in its further development, as necessary.

Principle 25

Peace, development and environmental protection are interdependent and indivisible.

Principle 26

States shall resolve all their environmental disputes peacefully and by appropriate means in accordance with the Charter of the United Nations.

Principle 27

States and people shall cooperate in good faith and in a spirit of partnership in the fulfilment of the principles embodied in this Declaration and in the further development of international law in the field of sustainable development.

Source : Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972 (United Nations publication, Sales No. E.73.II.A.14 and corrigendum), chap. I.

International Standard Industrial Classifications (ISIC Rev. 3.1)

- A - Agriculture, hunting and forestry
 - 01 - Agriculture, hunting and related service activities
 - 02 - Forestry, logging and related service activities
- B - Fishing
 - 05 - Fishing, aquaculture and service activities incidental to fishing
- C - Mining and quarrying
 - 10 - Mining of coal and lignite; extraction of peat
 - 11 - Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying
 - 12 - Mining of uranium and thorium ores
 - 13 - Mining of metal ores
 - 14 - Other mining and quarrying
- D - Manufacturing
 - 15 - Manufacture of food products and beverages
 - 16 - Manufacture of tobacco products
 - 17 - Manufacture of textiles
 - 18 - Manufacture of wearing apparel; dressing and dyeing of fur
 - 19 - Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
 - 20 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
 - 21 - Manufacture of paper and paper products
 - 22 - Publishing, printing and reproduction of recorded media
 - 23 - Manufacture of coke, refined petroleum products and nuclear fuel
 - 24 - Manufacture of chemicals and chemical products
 - 25 - Manufacture of rubber and plastics products
 - 26 - Manufacture of other non-metallic mineral products
 - 27 - Manufacture of basic metals
 - 28 - Manufacture of fabricated metal products, except machinery and equipment
 - 29 - Manufacture of machinery and equipment n.e.c.
 - 30 - Manufacture of office, accounting and computing machinery
 - 31 - Manufacture of electrical machinery and apparatus n.e.c.
 - 32 - Manufacture of radio, television and communication equipment and apparatus
 - 33 - Manufacture of medical, precision and optical instruments, watches and clocks
 - 34 - Manufacture of motor vehicles, trailers and semi-trailers
 - 35 - Manufacture of other transport equipment
 - 36 - Manufacture of furniture; manufacturing n.e.c.
 - 37 - Recycling
- E - Electricity, gas and water supply
 - 40 - Electricity, gas, steam and hot water supply
 - 41 - Collection, purification and distribution of water
- F - Construction
 - 45 - Construction
- G - Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
 - 50 - Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
 - 51 - Wholesale trade and commission trade, except of motor vehicles and motorcycles
 - 52 - Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
- H - Hotels and restaurants
 - 55 - Hotels and restaurants
- I - Transport, storage and communications
 - 60 - Land transport; transport via pipelines
 - 61 - Water transport
 - 62 - Air transport

- 63 - Supporting and auxiliary transport activities; activities of travel agencies
- 64 - Post and telecommunications
- J - Financial intermediation
 - 65 - Financial intermediation, except insurance and pension funding
 - 66 - Insurance and pension funding, except compulsory social security
 - 67 - Activities auxiliary to financial intermediation
- K - Real estate, renting and business activities
 - 70 - Real estate activities
 - 71 - Renting of machinery and equipment without operator and of personal and household goods
 - 72 - Computer and related activities
 - 73 - Research and development
 - 74 - Other business activities
- L - Public administration and defence; compulsory social security
 - 75 - Public administration and defence; compulsory social security
- M - Education
 - 80 - Education
- N - Health and social work
 - 85 - Health and social work
- O - Other community, social and personal service activities
 - 90 - Sewage and refuse disposal, sanitation and similar activities
 - 91 - Activities of membership organizations n.e.c.
 - 92 - Recreational, cultural and sporting activities
 - 93 - Other service activities
- P - Activities of private households as employers and undifferentiated production activities of private households
 - 95 - Activities of private households as employers of domestic staff
 - 96 - Undifferentiated goods-producing activities of private households for own use
 - 97 - Undifferentiated service-producing activities of private households for own use
- Q - Extraterritorial organizations and bodies
 - 99 - Extraterritorial organizations and bodies

Source : United Nations, Statistical Division (ISIC Rev. 3.1)

Central Product Classifications (CPC Ver.1.0)

- 0 - Agriculture, forestry and fishery products
 - 01 - Products of agriculture, horticulture and market gardening
 - 02 - Live animals and animal products
 - 03 - Forestry and logging products
 - 04 - Fish and other fishing products
- 1 - Ores and minerals; electricity, gas and water
 - 11 - Coal and lignite; peat
 - 12 - Crude petroleum and natural gas
 - 13 - Uranium and thorium ores
 - 14 - Metal ores
 - 15 - Stone, sand and clay
 - 16 - Other minerals
 - 17 - Electricity, town gas, steam and hot water
 - 18 - Water
- 2 - Food products, beverages and tobacco; textiles, apparel and leather products
 - 21 - Meat, fish, fruit, vegetables, oils and fats
 - 22 - Dairy products
 - 23 - Grain mill products, starches and starch products; other food products
 - 24 - Beverages
 - 25 - Tobacco products
 - 26 - Yarn and thread; woven and tufted textile fabrics
 - 27 - Textile articles other than apparel
 - 28 - Knitted or crocheted fabrics; wearing apparel
 - 29 - Leather and leather products; footwear
- 3 - Other transportable goods, except metal products, machinery and equipment
 - 31 - Products of wood, cork, straw and plaiting materials
 - 32 - Pulp, paper and paper products; printed matter and related articles
 - 33 - Coke oven products; refined petroleum products; nuclear fuel
 - 34 - Basic chemicals
 - 35 - Other chemical products; man-made fibres
 - 36 - Rubber and plastics products
 - 37 - Glass and glass products and other non-metallic products n.e.c.
 - 38 - Furniture; other transportable goods n.e.c.
 - 39 - Wastes or scraps
- 4 - Metal products, machinery and equipment
 - 41 - Basic metals
 - 42 - Fabricated metal products, except machinery and equipment
 - 43 - General purpose machinery
 - 44 - Special purpose machinery
 - 45 - Office, accounting and computing machinery
 - 46 - Electrical machinery and apparatus
 - 47 - Radio, television and communication equipment and apparatus
 - 48 - Medical appliances, precision and optical instruments, watches and clocks
 - 49 - Transport equipment
- 5 - Intangible assets; land; constructions; construction services
 - 51 - Intangible assets
 - 52 - Land
 - 53 - Constructions
 - 54 - Construction services
- 6 - Distributive trade services; lodging; food and beverage serving services; transport services; and utilities distribution services
 - 61 - Wholesale trade services
 - 62 - Retail trade services

- 63 - Lodging; food and beverage serving services
- 64 - Land transport services
- 65 - Water transport services
- 66 - Air transport services
- 67 - Supporting and auxiliary transport services
- 68 - Postal and courier services
- 69 - Electricity distribution services; gas and water distribution services through mains
- 7 - Financial and related services; real estate services; and rental and leasing services
 - 71 - Financial intermediation, insurance and auxiliary services
 - 72 - Real estate services
 - 73 - Leasing or rental services without operator
- 8 - Business and production services
 - 81 - Research and development services
 - 82 - Professional, scientific and technical services
 - 83 - Other professional, scientific and technical services
 - 84 - Telecommunications services; information retrieval and supply services
 - 85 - Support services
 - 86 - Production services, on a fee or contract basis
 - 87 - Maintenance and repair services
- 9 - Community, social and personal services
 - 91 - Public administration and other services to the community as a whole; compulsory social security services
 - 92 - Education services
 - 93 - Health and social services
 - 94 - Sewage and refuse disposal, sanitation and other environmental protection services
 - 95 - Services of membership organizations
 - 96 - Recreational, cultural and sporting services
 - 97 - Other services
 - 98 - Domestic services
 - 99 - Services provided by extraterritorial organizations and bodies

Source : United Nations, Statistical Division (CPC Ver.1.0)

Classification of Functions of Government (COFOG)

- 01 - General public services
 - 01.1 - Executive and legislative organs, financial and fiscal affairs, external affairs
 - 01.2 - Foreign economic aid
 - 01.3 - General services
 - 01.4 - Basic research
 - 01.5 - R&D General public services
 - 01.6 - General public services n.e.c.
 - 01.7 - Public debt transactions
 - 01.8 - Transfers of a general character between different levels of government
- 02 - Defence
 - 02.1 - Military defence
 - 02.2 - Civil defence
 - 02.3 - Foreign military aid
 - 02.4 - R&D Defence
 - 02.5 - Defence n.e.c.
- 03 - Public order and safety
 - 03.1 - Police services
 - 03.2 - Fire-protection services
 - 03.3 - Law courts
 - 03.4 - Prisons
 - 03.5 - R&D Public order and safety
 - 03.6 - Public order and safety n.e.c.
- 04 - Economic affairs
 - 04.1 - General economic, commercial and labour affairs
 - 04.2 - Agriculture, forestry, fishing and hunting
 - 04.3 - Fuel and energy
 - 04.4 - Mining, manufacturing and construction
 - 04.5 - Transport
 - 04.6 - Communication
 - 04.7 - Other industries
 - 04.8 - R&D Economic affairs
 - 04.9 - Economic affairs n.e.c.
- 05 - Environmental protection
 - 05.1 - Waste management
 - 05.2 - Waste water management
 - 05.3 - Pollution abatement
 - 05.4 - Protection of biodiversity and landscape
 - 05.5 - R&D Environmental protection
 - 05.6 - Environmental protection n.e.c.
- 06 - Housing and community amenities
 - 06.1 - Housing development
 - 06.2 - Community development
 - 06.3 - Water supply
 - 06.4 - Street lighting
 - 06.5 - R&D Housing and community amenities
 - 06.6 - Housing and community amenities n.e.c.
- 07 - Health
 - 07.1 - Medical products, appliances and equipment
 - 07.2 - Outpatient services
 - 07.3 - Hospital services
 - 07.4 - Public health services
 - 07.5 - R&D Health
 - 07.6 - Health n.e.c.

- 08 - Recreation, culture and religion
 - 08.1 - Recreational and sporting services
 - 08.2 - Cultural services
 - 08.3 - Broadcasting and publishing services
 - 08.4 - Religious and other community services
 - 08.5 - R&D Recreation, culture and religion
 - 08.6 - Recreation, culture and religion n.e.c.
- 09 - Education
 - 09.1 - Pre-primary and primary education
 - 09.2 - Secondary education
 - 09.3 - Post-secondary non-tertiary education
 - 09.4 - Tertiary education
 - 09.5 - Education not definable by level
 - 09.6 - Subsidiary services to education
 - 09.7 - R&D Education
 - 09.8 - Education n.e.c.
- 10 - Social protection
 - 10.1 - Sickness and disability
 - 10.2 - Old age
 - 10.3 - Survivors
 - 10.4 - Family and children
 - 10.5 - Unemployment
 - 10.6 - Housing
 - 10.7 - Social exclusion n.e.c.
 - 10.8 - R&D Social protection
 - 10.9 - Social protection n.e.c.

Source : United Nations, Statistical Division (Expenditure Classifications, 2000).

Classification of Individual Consumption by Purpose (COICOP)

- 01-12 - Individual consumption expenditure of households
- 01 - Food and non-alcoholic beverages
 - 01.1 - Food
 - 01.2 - Non-alcoholic beverages
- 02 - Alcoholic beverages, tobacco and narcotics
 - 02.1 - Alcoholic beverages
 - 02.2 - Tobacco
 - 02.3 - Narcotics
- 03 - Clothing and footwear
 - 03.1 - Clothing
 - 03.2 - Footwear
- 04 - Housing, water, electricity, gas and other fuels
 - 04.1 - Actual rentals for housing
 - 04.2 - Imputed rentals for housing
 - 04.3 - Maintenance and repair of the dwelling
 - 04.4 - Water supply and miscellaneous services relating to the dwelling
 - 04.5 - Electricity, gas and other fuels
- 05 - Furnishings, household equipment and routine household maintenance
 - 05.1 - Furniture and furnishings, carpets and other floor coverings
 - 05.2 - Household textiles
 - 05.3 - Household appliances
 - 05.4 - Glassware, tableware and household utensils
 - 05.5 - Tools and equipment for house and garden
 - 05.6 - Goods and services for routine household maintenance
- 06 - Health
 - 06.1 - Medical products, appliances and equipment
 - 06.2 - Outpatient services
 - 06.3 - Hospital services
- 07 - Transport
 - 07.1 - Purchase of vehicles
 - 07.2 - Operation of personal transport equipment
 - 07.3 - Transport services
- 08 - Communication
 - 08.1 - Postal services
 - 08.2 - Telephone and telefax equipment
 - 08.3 - Telephone and telefax services
- 09 - Recreation and culture
 - 09.1 - Audio-visual, photographic and information processing equipment
 - 09.2 - Other major durables for recreation and culture
 - 09.3 - Other recreational items and equipment, gardens and pets
 - 09.4 - Recreational and cultural services
 - 09.5 - Newspapers, books and stationery
 - 09.6 - Package holidays
- 10 - Education
 - 10.1 - Pre-primary and primary education
 - 10.2 - Secondary education
 - 10.3 - Post-secondary non-tertiary education
 - 10.4 - Tertiary education
 - 10.5 - Education not definable by level
- 11 - Restaurants and hotels
 - 11.1 - Catering services
 - 11.2 - Accommodation services

- 12 - Miscellaneous goods and services
 - 12.1 - Personal care
 - 12.2 - Prostitution
 - 12.3 - Personal effects n.e.c.
 - 12.4 - Social protection
 - 12.5 - Insurance
 - 12.6 - Financial services n.e.c.
 - 12.7 - Other services n.e.c.
- 13 - Individual consumption expenditure of non-profit institutions serving households (NPISHs)
 - 13.1 - Housing
 - 13.2 - Health
 - 13.3 - Recreation and culture
 - 13.4 - Education
 - 13.5 - Social protection
 - 13.6 - Other services
- 14 - Individual consumption expenditure of general government
 - 14.1 - Housing
 - 14.2 - Health
 - 14.3 - Recreation and culture
 - 14.4 - Education
 - 14.5 - Social protection

Source : United Nations, Statistical Division (Expenditure Classifications, 2000).

Classification of the Purposes of Non-Profit Institutions (COPNI)

- 01 - Housing
 - 01.0 - Housing
- 02 - Health
 - 02.1 - Medical products, appliances and equipment
 - 02.2 - Outpatient services
 - 02.3 - Hospital services
 - 02.4 - Public health services
 - 02.5 - R&D Health
 - 02.6 - Other health services
- 03 - Recreation and culture
 - 03.1 - Recreational and sporting services
 - 03.2 - Cultural services
- 04 - Education
 - 04.1 - Pre-primary and primary education
 - 04.2 - Secondary education
 - 04.3 - Post-secondary non-tertiary education
 - 04.4 - Tertiary education
 - 04.5 - Education not definable by level
 - 04.6 - R&D Education
 - 04.7 - Other educational services
- 05 - Social protection
 - 05.1 - Social protection services
 - 05.2 - R&D Social protection
- 06 - Religion
 - 06.0 - Religion
- 07 - Political parties, labour and professional organizations
 - 07.1 - Services of political parties
 - 07.2 - Services of labour organizations
 - 07.3 - Services of professional organizations
- 08 - Environmental protection
 - 08.1 - Environmental protection services
 - 08.2 - R&D Environmental protection
- 09 - Services n.e.c.
 - 09.1 - Services n.e.c.
 - 09.2 - R&D Services n.e.c.

Source : United Nations, Statistical Division (Expenditure Classifications, 2000).

Classification of the Outlays of Producers according to Purpose (COPP)

01 Outlays on Infrastructure

- 01.1 Outlays on Road and Land Construction and Improvement
- 01.2 Outlays on Engineering and Related Technological work
- 01.3 Outlays on Information Management

02 Outlays on Research and Development

- 02.1 Outlays on Research and Experimental Development on Natural Science and Engineering)
- 02.2 Outlays on Research and Experimental Development on Social Science and Humanities)

03 Outlays on Environmental Protection

- 03.1 Outlays on Protection of Ambient Air and Climate
- 03.2 Outlays on Waste Water Management)
- 02.3 Outlays on Waste Management
- 03.4 Outlays Protection of Soil and Ground Water)
- 03.5 Outlays on protection of Noise and Vibration Abatement
- 03.6 Outlays on protection of biodiversity and landscape
- 03.7 Outlays on Environmental protection n.e.c.

04 Outlays on Marketing

- 04.1 Outlays on Direct Sales Efforts
- 04.2 Outlays on Advertising)
- 04.3 Outlays on Marketing n.e.c

05 Outlays on Human Resource Development

- 05.1 Outlays on Education and Training
- 05.2 Outlays on Health
- 05.3 Outlays on Social Services

06 Outlays on Current Production Programs, Administration and Management

- 06.1 Outlays on Current Production Programs)
- 06.2 Outlays on External Transportation)
- 06.3 Outlays on Safety and Security)
- 06.4 Outlays on Management and Administration)

Source : United Nations, Statistical Division (Expenditure Classifications, 2000).

SEEA Asset Classification

EA1: Natural Resources:

- EA 11 Mineral and energy resources (metallic and non-metallic)
- EA 12 Social resource (Agriculture and non-agriculture)
- EA 13 Water resources (Surface and ground water)
- EA 14 Biological resources (timber resources, crop and plant resources, aquatic resources and animal resources other than aquatic)

EA.2: Land:

- EA.21: Land underlying building and structures (dwelling, non-residential dwelling, transportation electricity power grids, pipeline, sewerage etc.)
- EA 22: Agricultural land (Cultivated land, pasture land and other agricultural land)
- EA 23: Wooded land (forest and other wooded land)
- EA 24: Major water bodies (lakes, rivers, Wetland and artificial seniors).

EA.3: Ecosystems

- EA.31: Terrestrial ecosystem (urban ecosystem, Agricultural forest, grassland, tundra, dry land and other terrestrial ecosystem.
- EA 32: Aquatic ecosystem. (marine, coastal, riverine, lacustrine and other aquatic ecosystem.
- EA 33: Atmospheric ecosystem.

EA.M: Memorandum Item- Intangible Environmental Assets.

- EA.M1: Mineral exploration
- EA.M2: Transferable licenses and concession for the exploration of natural resources.
- EA.M3: Tradeable permits allowing the emission of residuals
- EA. M4: Other intangible non-produced environmental assets.

Source : United Nations, Statistical Division.

MDG Indicators

All indicators should be disaggregated by sex and urban/rural as far as possible.

Effective 15 January 2008

| Millennium Development Goals (MDGs) | |
|--|--|
| Goals and Targets (from the Millennium Declaration) | Indicators for monitoring progress |
| Goal 1: Eradicate extreme poverty and hunger | |
| Target 1.A: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day | 1.1 Proportion of population below \$1 (PPP) per day ^j 1.2 Poverty gap ratio 1.3 Share of poorest quintile in national consumption |
| Target 1.B: Achieve full and productive employment and decent work for all, including women and young people | 1.4 Growth rate of GDP per person employed 1.5 Employment-to-population ratio 1.6 Proportion of employed people living below \$1 (PPP) per day 1.7 Proportion of own-account and contributing family workers in total employment |
| Target 1.C: Halve, between 1990 and 2015, the proportion of people who suffer from hunger | 1.8 Prevalence of underweight children under-five years of age 1.9 Proportion of population below minimum level of dietary energy consumption |
| Goal 2: Achieve universal primary education | |
| Target 2.A: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling | 2.1 Net enrolment ratio in primary education 2.2 Proportion of pupils starting grade 1 who reach last grade of primary 2.3 Literacy rate of 15-24 year-olds, women and men |
| Goal 3: Promote gender equality and empower women | |
| Target 3.A: Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015 | 3.1 Ratios of girls to boys in primary, secondary and tertiary education 3.2 Share of women in wage employment in the non-agricultural sector 3.3 Proportion of seats held by women in national parliament |
| Goal 4: Reduce child mortality | |
| Target 4.A: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate | 4.1 Under-five mortality rate 4.2 Infant mortality rate 4.3 Proportion of 1 year-old children immunised against measles |
| Goal 5: Improve maternal health | |
| Target 5.A: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio | 5.1 Maternal mortality ratio 5.2 Proportion of births attended by skilled health personnel |
| Target 5.B: Achieve, by 2015, universal access to reproductive health | 5.3 Contraceptive prevalence rate 5.4 Adolescent birth rate 5.5 Antenatal care coverage (at least one visit and at least four visits) 5.6 Unmet need for family planning |
| Goal 6: Combat HIV/AIDS, malaria and other diseases | |
| Target 6.A: Have halted by 2015 and begun to reverse the spread of HIV/AIDS | 6.1 HIV prevalence among population aged 15-24 years 6.2 Condom use at last high-risk sex 6.3 Proportion of population aged 15-24 years with comprehensive correct knowledge of HIV/AIDS 6.4 Ratio of school attendance of orphans to school attendance of non-orphans aged 10-14 years |

| Millennium Development Goals (MDGs) | |
|--|---|
| Goals and Targets (from the Millennium Declaration) | Indicators for monitoring progress |
| Target 6.B: Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it | 6.5 Proportion of population with advanced HIV infection with access to antiretroviral drugs |
| Target 6.C: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases | 6.6 Incidence and death rates associated with malaria 6.7 Proportion of children under 5 sleeping under insecticide-treated bednets 6.8 Proportion of children under 5 with fever who are treated with appropriate anti-malarial drugs 6.9 Incidence, prevalence and death rates associated with tuberculosis 6.10 Proportion of tuberculosis cases detected and cured under directly observed treatment short course |
| Goal 7: Ensure environmental sustainability | |
| Target 7.A: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources | 7.1 Proportion of land area covered by forest 7.2 CO ₂ emissions, total, per capita and per \$1 GDP (PPP) 7.3 Consumption of ozone-depleting substances 7.4 Proportion of fish stocks within safe biological limits 7.5 Proportion of total water resources used 7.6 Proportion of terrestrial and marine areas protected 7.7 Proportion of species threatened with extinction |
| Target 7.B: Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss | |
| Target 7.C: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation | 7.8 Proportion of population using an improved drinking water source 7.9 Proportion of population using an improved sanitation facility |
| Target 7.D: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers | 7.10 Proportion of urban population living in slums ⁱⁱ |
| Goal 8: Develop a global partnership for development | |
| Target 8.A: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system Includes a commitment to good governance, development and poverty reduction – both nationally and internationally | <i>Some of the indicators listed below are monitored separately for the least developed countries (LDCs), Africa, landlocked developing countries and small island developing States.</i> <u>Official development assistance (ODA)</u> 8.1 Net ODA, total and to the least developed countries, as percentage of OECD/DAC donors' gross national income 8.2 Proportion of total bilateral, sector-allocable ODA of OECD/DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation) 8.3 Proportion of bilateral official development assistance of OECD/DAC donors that is untied 8.4 ODA received in landlocked developing countries as a proportion of their gross national incomes 8.5 ODA received in small island developing States as a proportion of their gross national incomes <u>Market access</u> 8.6 Proportion of total developed country imports (by value and excluding arms) from developing countries and least developed countries, admitted free of duty 8.7 Average tariffs imposed by developed countries on agricultural products and textiles and clothing from developing countries 8.8 Agricultural support estimate for OECD countries as a percentage of their gross domestic product 8.9 Proportion of ODA provided to help build trade capacity |
| Target 8.B: Address the special needs of the least developed countries | |
| Includes: tariff and quota free access for the least developed countries' exports; enhanced programme of debt relief for heavily indebted poor countries (HIPC) and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction | |
| Target 8.C: Address the special needs of landlocked developing countries and small island developing States (through the Programme of Action for the Sustainable Development of Small Island Developing States and the outcome of the twenty-second special session of the General Assembly) | |
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| Millennium Development Goals (MDGs) | |
|--|--|
| Goals and Targets (from the Millennium Declaration) | Indicators for monitoring progress |
| Target 8.D: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term | <u>Debt sustainability</u> 8.10 Total number of countries that have reached their HIPC decision points and number that have reached their HIPC completion points (cumulative) 8.11 Debt relief committed under HIPC and MDRI Initiatives 8.12 Debt service as a percentage of exports of goods and services |
| Target 8.E: In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries | 8.13 Proportion of population with access to affordable essential drugs on a sustainable basis |
| Target 8.F: In cooperation with the private sector, make available the benefits of new technologies, especially information and communications | 8.14 Telephone lines per 100 population 8.15 Cellular subscribers per 100 population 8.16 Internet users per 100 population |

The Millennium Development Goals and targets come from the Millennium Declaration, signed by 189 countries, including 147 heads of State and Government, in September 2000 (<http://www.un.org/millennium/declaration/ares552e.htm>) and from further agreement by member states at the 2005 World Summit (Resolution adopted by the General Assembly - A/RES/60/1, <http://www.un.org/Docs/journal/asp/ws.asp?m=A/RES/60/1>). The goals and targets are interrelated and should be seen as a whole. They represent a partnership between the developed countries and the developing countries "to create an environment – at the national and global levels alike – which is conducive to development and the elimination of poverty".

Source : *Millennium Development Goals, 2008*.

ⁱ For monitoring country poverty trends, indicators based on national poverty lines should be used, where available.

ⁱⁱ The actual proportion of people living in slums is measured by a proxy, represented by the urban population living in households with at least one of the four characteristics: (a) lack of access to improved water supply; (b) lack of access to improved sanitation; (c) overcrowding (3 or more persons per room); and (d) dwellings made of non-durable material.

United Nations Framework for the Development of Environment Statistics

UNSD developed a list of environmental indicators in collaboration with the Inter-governments Working Group on the Advancement of Environment Statistics. The meeting of the Working Group (Stockholm, 6-10 February 1995) agreed on the list of environmental and related socioeconomic indicators below. The Statistical Commission, at its twenty-eight session (New York 27 February-3 March 1990), approved this list for international compilation by UNSD. The indicators that are bolded in the list were indicated for short-term compilation directly from national statistical services or from other international organizations or specialized agencies

United Nations Statistics Division, Framework for the Development of Environment Statistics, Components and Information Categories

| Components/ Agenda 21 Issues(clusters) | A. Socioeconomic activities, events | B. Impacts and effects | C. Responses to impacts | D. Inventories, stocks, background conditions |
|--|--|---|--|--|
| ECONOMIC ISSUES | Real GDP per capita growth rate | EDP/EVA per capita | Environmental protection expenditure as % of GDP | Produced capital stock |
| | Production and consumption patterns | Capital accumulation (environmentally adjusted) | Environmental taxes and subsidies as % of government revenue | |
| | Investment share in GDP | | | |
| SOCIAL/DEMO- GRAPHIC ISSUES | Population growth rate | % of urban population exposed to concentrations of SO ₂ , particulates, ozone, CO and Pb | | Population living in absolute poverty |
| | Population density | Infant mortality rate | | Adult literacy rate |
| | Urban/rural migration rate | Incidence of environmentally related diseases | | Combined primary and secondary school enrollment ratio |
| | Calorie supply per capita | | | Life expectancy at birth |
| | | | | Females per 100 males in secondary school |
| AIR/CLIMATE | Emissions of CO ₂ , SO ₂ and NO _x | Ambient concentrations of CO, SO ₂ , NO _x O ₃ and TSP in urban areas | Expenditure on air pollution abatement | Weather and climate conditions |
| | Consumption of ozone depleting substances | Air quality index | Reduction in consumption of substances and emissions | |

United Nations Statistics Division, Framework for the Development of Environment Statistics, Components and Information Categories (contd...)

| Components/ Agenda 21 Issues(clusters) | A. Socioeconomic activities, events | B. Impacts and effects | C. Responses to impacts | D. Inventories, stocks, background conditions |
|---|--|---|---|--|
| LAND/SOIL | Land use change | Area affected by soil erosion | Protected area as % of total land area | Arable land per capita |
| | Livestock per km ² of arid and semi-arid lands | Land affected by desertification | | |
| | Use of fertilizers | Area affected by salinization and water logging | | |
| | Use of agricultural pesticides | | | |
| WATER : Fresh water resources and Marine water resources | Industrial, agricultural and municipal discharges directly into freshwater bodies | Concentration of lead, cadmium, mercury and pesticides in fresh water bodies | Waste water treatment, total and by type of treatment (% of population served) | Groundwater reserves |
| | Annual withdrawals of ground and surface water | Concentration of fecal coliform in fresh water bodies | Access to safe drinking water (% of population served) | |
| | Domestic consumption of water per capita | Acidification of fresh water bodies | | |
| | Industrial, agricultural water use per GDP | BOD and COD in fresh water bodies | | |
| | Industrial, agricultural and municipal discharges directly into marine water bodies | Water quality index by fresh water bodies | | |
| | Discharges of oil into coastal waters | Deviation in stock from maximum sustainable yield of marine species | | |
| | | Loading of N and P in coastal waters | | |
| OTHER NATURAL RESOURCES : Biological resources and Mineral (incl. energy) resources | Annual round wood production | Deforestation rate | Reforestation rate | Forest inventory |
| | Fuel wood consumption per capita | Threatened, extinct species | Protected forest area as % of total land area | Ecosystems inventory |
| | Catches of marine species | | | Fauna and flora inventory |
| | Annual energy consumption per capita | | | Fish stocks |
| | Extraction of other mineral resources | Depletion of mineral resources (% of proven reserves) | | Proven mineral reserves |
| | | Lifetime of proven reserves | | Proven energy reserves |

United Nations Statistics Division, Framework for the Development of Environment Statistics, Components and Information Categories (contd...)

| Components/ Agenda 21 Issues(clusters) | A. Socioeconomic activities, events | B. Impacts and effects | C. Responses to impacts | D. Inventories, stocks, background conditions |
|--|--|--|--|--|
| WASTE | Municipal waste disposal | Area of land contaminated by toxic waste | Expenditure on waste collection and treatment | |
| | Generation of hazardous waste | | Waste recycling | |
| | Imports and exports of hazardous wastes | | | |
| HUMAN SETTLEMENTS | Rate of growth of urban population | Area and population in marginal settlements | Expenditure on low-cost housing | Stock of shelter and infrastructure |
| | % of population in urban areas | Shelter index | | |
| | Motor vehicles in use per 1000 habitants | % of population with sanitary services | | |
| NATURAL DISASTERS | Frequency of natural disasters | Cost and number of injuries and fatalities related to natural disasters | Expenditure on disaster prevention and mitigation | Human settlements vulnerable to natural disasters |

Source : United Nations, Statistical Division.

Glossary

Abiotic. non-living, e.g. rocks or minerals.

Abatement: technology applied or measure taken to reduce pollution and/or its impacts on the environment. The most commonly used technologies are scrubbers, noise mufflers, filters, incinerators, waste-water treatment facilities and composting of wastes.

Agenda 21: the plan of action to achieve sustainable development that was adopted by world leaders at the United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil, in June 1992.

Algae: *simple non-vascular plants with unicellular organs of reproduction. Algae are found in fresh and salt water. They range from unicellular forms, usually microscopic, to multi cellular forms up to 30 m in length.*

Afforestation: artificial establishment of forests by planting or seeding in an area of non-forest land.

Acidification: increase of hydrogen ions, usually expressed as pH value of environmental media.

Airborne Disease: disease that is generally transmitted by nasopharyngeal discharges and by respiratory secretions, through coughing and sneezing, though it may also be conveyed through close contact. Respiratory diseases include the common childhood infections, measles, whooping cough, chickenpox, mumps, diphtheria and acute sore throat, as well as diseases of the respiratory tract, influenza and other acute viral infections, the pneumonias, and pulmonary tuberculosis (WHO, 1992).

Air Pollution: the presence of contaminant of pollutants in the air that do not disperse properly and that interferes with human health or produces other harmful environmental effects.

Air Pollution Index (API) : quantitative measure that describes ambient air quality. The index is obtained by combining figures for various air pollutants into a single measurement.

Air Quality Standards: levels of air pollutants prescribed by regulations that may not be exceeded during a specified time in a defined area.

Air Pollutants: substances in air that could, at high enough concentrations, harm human beings, animals, vegetation or material. Air pollutants may thus include forms of matter of almost any natural or artificial composition capable of being airborne. They may consist of solid particles, liquid droplets or gases, or combinations of these forms. See also hazardous air pollutants.

Acid Precipitation / Rain: any form of precipitation (rain, snow, hail or fog) whose acidity has been increased through the uptake of acid pollutants from the air.

Alternate Energy: energy sources other than the traditional forest product and commercial energy items. They are: Direct Solar Insulation, Wind, Micro-hydro, Geothermal, Bio-gas plants.

Assets: Assets are entities that must be owned by some unit, or units, and which economic benefits are derived by their owner(s) by holding or using them over the period of time.

Ambient: surrounding, environmental.

Annual Average: average of concentrations measured over one year.

Annual Rainfall (mm): total rainfall in a year

Average Daily Sunshine Hours: average of daily sunshine hours measured over one year.

Acidity: acidity as applied to water is defined as the quantitative capacity of aqueous media to react with hydroxyl ions. The determination of acidity may provide an index of the severity of pollution or may indicate the probable behavior of water in treatment processes.

Alkalinity: the alkalinity of a solution may be defined as the capacity for solutes it contains to react with and neutralize acid. In water the alkalinity is produced by the dissolved carbon dioxide species, bicarbonate and carbonate. There are three types of alkalinity methyl-orange alkalinity, total alkalinity, and phenolphthalein alkalinity.

Ammonia: the term ammonia includes the non-ionised ammonia molecule and ionised ammonium ion species. Ammonia in water is an indicator of possible bacterial, sewage and animal waste pollution. No health related

guidance value for drinking water has been set by WHO but concentration above 1.5 mg/l creates odour and taste problems.

Aquifer: underground geologic formation, or group of formation, containing ground water that can supply wells and springs.

Amphibians: class of cold-blooded vertebrates comprising frogs. They live both in water and on land. Most amphibians have to become temporarily aquatic for the purpose of reproduction.

Angiosperm: *flowering plants, which produce one or more seeds enclosed in a fruit.*

Bacteria: single-celled micro-organisms. Some are useful in pollution control because they break down the organic matter in water and land. Other bacteria may cause disease.

Baseline : The baseline (or reference) is any datum against which change is measured. It might be a current " current baseline " in which case it presents observable present-day condition. It might also be a future baseline, which is a projected future set of condition excluding the driving factor of interest. Alternative interpretation of the reference conditions can give rise to multiple baseline.

Base Period: the period that provides the weights for an index is described as the base period

Biodiversity: the range of genetic differences, species difference and ecosystem difference in a given area.

Biomass: total living weight (generally in dry weight) of all living organisms in a particular area or habitat. It is sometimes expressed as weight per unit area of land or per unit volume of water.

Bryophytes: non-vascular and non-flowering plants comprising mosses and liverworts, widely distributed on moist soil and rocks.

Biological diversity: the variety of life forms: the different plants, animals and microorganisms, the genes they contain, and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecosystems diversity.

Biochemical Oxygen Demand (BOD): the biochemical oxygen demand is the mass of dissolved molecular oxygen, which is needed by micro organisms for the aerobic oxidation of organic substances to CO₂ and water. Generally in water analysis BOD is determined at 20°C with 5 days incubation period. It depends on the amount of organic substances present in water and is useful in expressing stream pollution load. Generally, effluents having BOD value greater than 4 mg/l are not allowed to be discharged into water courses.

Bio-gas: mixture of methane and carbon dioxide in the ratio of 7:3 that is produced by the treatment of animal dung, industrial wastes and crop residues. It is used as an alternative source of energy.

Biogeography: the scientific study of the geographic distribution of organisms.

Biota: All the organisms, including animals, plants, fungi and microorganisms in a given area.

Chromosome: body found in the nucleus of living cells, composed mainly of DNA and protein, in a linear sequence of genes. Exchange of genes during sexual reproduction is facilitated by splitting of chromosomes during fertilization.

Carbon Dioxide (CO₂): It is a chemical compound consisting of one atom of carbon and two atoms of oxygen. A colorless, odorless, non-poisonous gas, which results from fossil fuel combustion and burning of materials, and is normally a part of ambient air.

Carbon Monoxide (CO): It is a chemical compound consisting of one atom of carbon and one atom of oxygen. It is a colorless and odorless gas formed whenever carbon or substances containing carbon are burned with an insufficient air supply (incomplete fuel combustion). It is poisonous to all warm-blooded animals and to many other forms of life. Automobile - exhaust gases contain harmful quantities of carbon monoxide.

Catchments Area: area from which rainwater drains into river system, lakes and seas.

Climate : Climate in a narrow sense is usually defined as the ' average weather ' or more rigorously , as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of millions of years. These quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description , of the climate system. The classical period of time is 30 years, as defined by the World Meteorological Organization (WMO).

Climate change : Climate change refers to a change in the state of the climate that can be identified (e.g. using statistical test) by a change in the mean and/ or the variability of its properties, and that persists or extends over period, typically decades or longer. Climate change may be due to natural internal processes or external forcing, or to persistent anthropogenic change in the composition of the atmosphere or in land use.

Community Soil: It is a practice of managing the conservation of soil erosion or soil quality by community participation.

Consumption: consumption is an activity in which institutional units use up goods or service, consumption can be either intermediate or final

Chloro-fluorocarbons (CFCs): inert, non-toxic and easily liquefied chemicals used in refrigeration, air-conditioning, packaging and insulation, or as solvents and aerosol propellants. Because CFCs are not destroyed in the lower atmosphere, they drift into the upper atmosphere where their chlorine components destroy ozone. They are also among the greenhouse gases that may affect climate change. See also aerosol propellant.

Chemical Oxygen Demand (COD): chemical oxygen demand (COD) is used as a measure of the oxygen equivalent of the organic matter content of a sample that is susceptible to oxidation by a strong chemical oxidant. It is a measure of the total amount of oxygen required for oxidation of waste to CO₂ and water and is used to determine pollution or oxidizable material loads quickly.

Coliform: coli form organisms are defined as Gram-negative, rod-shaped, non-sporing bacteria capable of growing in the presence of bile salts or other surface-active agents and of fermenting lactose within 48 hours at 35-37°C. This group of bacteria includes organisms originating from the intestinal tract of warm-blooded animals and also from soil and vegetation. Its presence in water indicates probable contamination from human waste. Recent health related WHO guideline value for drinking water does not permit the presence of even a single coliform bacterium in drinking water.

Color: the term color is used to mean true color, that is, the color of water from which turbidity has been removed. Color in water may result from the presence of natural metallic ions (iron & manganese) humus and peat materials, plankton, weeds, and industrial wastes.

Dicotyledon: flowering plants with two seed leaves in embryo plant. Includes many forest and fruit trees, food plants and ornamentals.

Decibel (dB): unit of sound measurement on a logarithmic scale, with sound approximately doubling in loudness for every increase of 10 decibels.

Dust: particles light enough to be suspended in air.

Deforestation: clearing of tree formations and their replacement by non-forest land uses.

DNA: deoxyribonucleic acid, chief constituent of chromosomes.

DNA (deoxyribonucleic acid): the genetic material of most living organisms, which is a major constituent of the chromosomes within the cell nucleus and plays a central role in the determination of hereditary characteristics by controlling protein synthesis in cells.

Degraded Land (natural): land deteriorated through a reduction in soil depth or quality as a result of water or wind erosion, landslides or water logging etc. This excludes land in the process of desertification.

Degraded Land (man made): this refers to the land deteriorated through a reduction in soil depth or quality as a result of deforestation, de-vegetation faulty irrigation system, excessive chemical fertilizers in localized area, unwise use of marginal land, road building in the hills etc. This also excludes land in the process of desertification.

Denudation: 1. erosion by rain, frost, wind or water of the solid matter of the earth. The term often implies the removal of soil down to the bedrock; 2. removal, by natural or artificial means, of all vegetation and organic matter.

Depletion (in natural resource accounting): for renewable resources, the part of the harvest, logging, catch and so forth above the sustainable level of the resource stock; for non-renewable resources, the quantity of resources extracted. In the SNA it is defined as the reduction in value of deposits of subsoil assets, natural forests, fish stocks in the open seas and other non-cultivated biological resources as a result of the physical removal and using up of the assets.

Drop Out Rate: the percent of children entering a level of education who do not successfully complete that level in due course.

Domestic Output: domestic output is output produced by residence enterprises.

Dissolved Oxygen (DO): dissolved oxygen is an important parameter of water quality. The water when comes in contact with air dissolves oxygen depending on, or according to atmospheric pressure, the temperature, and the content of dissolved salts. Its presence is essential to maintain the higher forms of biological life and the effect of a waste discharged on a river is largely determined by the oxygen balance of the system. Aquatic animals require certain amounts of DO depending upon their species, stage of development, level of activity and the water temperature.

Domestic Waste: domestic waste consists of solid and liquid wastes originating from residential, commercial and institutional buildings. These are both biodegradable and non-biodegradable.

Emission: In the climate change context, emission refers to the release of Green House Gas and / or their precursors and aerosols into the atmosphere over a specified area and period of time.

Environment: the totality of all the external conditions affecting the life, development and survival of an organism.

Environmental Assets: all natural assets which are not economic assets. Environmental assets are non-produced natural assets that do not function as providers of natural resource inputs into production but as providers of environmental services of waste absorption, ecological functions such as habitat or flood and climate control, and other non-economic amenities such as health and aesthetical values. See natural assets.

Environmental Costs: cost connected with the actual or potential deterioration of natural assets due to economic activities. Such costs can be viewed from two different perspectives, namely as (a) costs caused, that is, costs associated with economic units actually or potentially causing environmental deterioration by their own activities or as (b) costs borne, that is, costs incurred by economic units independently of whether they have actually caused the environmental impacts.

Environmental Expenditures: capital and current expenditures related to characteristic activities and facilities specified in classifications of environmental protection activities.

Environmental Impact: direct effect of socio-economic activities and natural events on the components of the environment.

Environmental Impact Assessment (EIA): analytical process that systematically examines the possible environmental consequences of the implementation of projects, programmes and policies.

Environmental Indicator: parameter, or a value derived from parameters, that points to, provides information about and/or describes the state of the environment, and has a significance extending beyond that directly associated with any given parametric value. The term may encompass indicators of environmental pressures, conditions and responses (OECD, 1994).

Environmental Media: abiotic components of the natural environment, namely, air, water and land.

Environmental Protection: any activity to maintain or restore the quality of environmental media through preventing the emission of pollutants or reducing the presence of polluting substances in environmental media.

Environmental taxes: a tax whose tax base is in physical unit (or a proxy of it) that has a proven negative impact on the environment.

Environmental Statistics: statistics that describe the state and trends of the environment, covering the media of the natural environment (air/climate, water, land/soil) the biota within the media and human settlement. Environment statistics are integrative in nature, measuring human activities and natural events that affect the environment, the impacts of these activities and events, social responses to environment impacts and the quality and availability of natural assets. Broad definition includes environmental indicators, indices and accounting.

Environmental Accounting: the term usually refers to environment auditing, but may also include the costing of environmental impacts caused by the corporation.

Ecology: totality or pattern of relationships between organisms and their environment.

Exotic: species introduced from one locality to another locality.

Ecosystem: a dynamic complex of plant, animal, fungal and microorganism communities unit.

Ecological processes: which play an essential part in maintaining ecosystem integrity. Four fundamental ecological processes are the cycling of water, the cycling of nutrients, the flow of energy, and biodiversity (as an expression of the process of evolution).

Emission: discharge of pollutants into the atmosphere from stationary sources such as smokestacks, other vents, surface areas of commercial or industrial facilities and mobile sources, for example, motor vehicles, locomotives and aircraft.

Endemic Disease: disease that is only, or regularly, found among a specified population or in a specified locality.

Environment: the totality of all the external conditions affecting the life, development and survival of the organism.

Effluent: liquid waste product (whether treated or untreated) discharged from an industrial process or human activity that is discharged into the environment.

Eutrophication: when water bodies like lakes, reservoirs streams, & estuaries receive effluents rich in nutrients (phosphorous and nitrogen) growth of water plants (algae) is stimulated as a result of which deoxygenating of the water, major ecological changes, increase in turbidity, increase in rate of sedimentation occur. An insidious form of water pollution that causes progressive deterioration of water resources on a wide scale by the overabundance of plant life as a result of over enrichment with the nutrients is known as Eutrophication.

Earthquake: sudden shaking or trembling of the earth caused by faulting or volcanic activity.

Ecoregion / eco-zone: homogeneous area of one or more ecosystems that interact with relatively self-contained human activities.

Erosion: wearing away of the land by running water, rainfall, wind, ice or other geological agents, including such processes as detachment, entrainment, suspension, transportation and mass movement. Geologically, erosion is defined as the process that slowly shapes hillsides, allowing the formation of soil cover from the weathering of rocks and from alluvial and colluvial deposits. Erosion is often intensified by land-clearing human activities related to farming, resident and industrial development and it has as effect increasing run-offs, decline of arable layers, siltation in lakes, lagoons and oceans.

Environmental Disease: disease that is, at least in part, caused or aggravated by living conditions, climate and water supply or other environmental conditions. Environmental factors that may affect health include psychological, biological, physical and accident-related factors. Environmental diseases include in particular communicable diseases, such as respiratory diseases, and vector-borne diseases such as malaria, schistosomiasis and onchocerciasis. See also airborne disease and waterborne disease.

Epidemic: widespread outbreak of a disease that affects a large number of individuals at a particular time.

Enrollment Ratio (gross): the ratio of the number of students, regardless of age, enrolled at a particular level of education to population of specified age.

Enrollment Ratio (net): the ratio of the number of students specified age enrolled in a level of education to total population of that age for the level.

Endangered: plant and animal species which are under threat and likely to become extinct if casual factors continue operating. They may be abundant over their range but are endangered because of such factors as habitat deterioration, trade or the onset of disease.

Endemic: plants or animals prevalent in or peculiar to a particular locality, region or people.

Extinct Species: the endangered or threatened plant and animal species lost for ever because of their habitat being destroyed through a change in land use or some use for them resulted in mass slaughter/over use or export.

Family: a taxonomic group of genera, which have certain characteristics in common.

Fauna. all of the animals found in a given area.

Flora: all of the plants found in a given area.

Fungi: simple plants including moulds and mushrooms with thread like cells and without green chlorophyll. Fungi have no roots, stem, or leaves like flowering plants and ferns.

Forested Land: these are areas of forest vegetation, having at least of ten percent crown covers, which also includes small pockets of plantation and burned areas.

Faecal Coliform: faecal coli forms are that part of the coli form group which is present in the intestines and faeces of warm-blooded animals. These bacteria are capable of producing gas from lactose and form blue colonies within 24 hours when incubated at $44.5^{\circ}\text{C} \pm 0.2^{\circ}\text{C}$ on M-FC medium. It should be nil in potable water according to WHO guideline.

Global Warming: phenomenon believed to occur as a result of the build-up of carbon dioxide and other greenhouse gases. It has been identified by many scientists as a major global environmental threat. See also greenhouse effect.

Gross Domestic Product (GDP): gross domestic product is a measure of net aggregate of the total value of output produced within the boundary of a country or territory in a specified period of time.

Greenhouse Effect: warming of the earth's atmosphere caused by a build-up of carbon dioxide and other greenhouse or trace gases that act like a pane of glass in a greenhouse, allowing sunlight to pass through and heat the earth but preventing a counterbalancing loss of heat radiation.

Genus (genera). a category used in the classification of organisms that consists of a number of closely related species.

Gene: hereditary factor, transmitted from generation to generation of plants and animals, that is responsible for the determination of a particular characteristic, for example, color, height or sex.

Gymnosperm: Plants that have naked seeds, which form an intermediate group between the cryptogams and the angiosperms. Examples: cicadas and conifers. They are primitive seed plants with many fossil representatives.

Gross National Product (GNP): gross national product is the sum of GDP and net factor income from abroad.

Gross Saving: gross saving is gross disposable income less final consumption expenditure

Green GDP: popular term for environmentally adjusted gross domestic product. See also environmentally adjusted net domestic product.

Herbs: plant with soft stem that dies down to the ground after each season's growth, as distinguished from shrubs and trees. Also any plant used as a medicine or seasoning, e.g. thyme, surpentine.

Herbarium Identification: collection of preserved plant specimens for scientific study or research and reference purposes.

Hydroxyl Ion: a hydroxyl ion consists of one atom of hydrogen and one atom of oxygen and carries one unit of negative charge.

Habitat: the place type of site where an organism naturally occurs.

Human Settlements: integrative concept that comprises (a) physical components of shelter and infrastructure and (b) services to which the physical elements provide support, that is to say, community services such as education, health, culture, welfare, recreation and nutrition.

Hardness: this is the property of water, which prevents lather formation with soap and produces scale in pipelines. It is due mainly to dissolved calcium and magnesium ions. Carbonate hardness (temporary hardness) is due to the presence of these metals associated with bicarbonate while non-carbonate hardness (permanent hardness) is due to the presence of these metals associated with sulphate/chloride or nitrate.

Hazardous Waste: hazardous wastes include toxic chemicals, biological and medical wastes, flammable wastes, corrosive wastes, radioactive wastes, and explosives. They usually are produced in industrial operations or in technical institutions.

Hazen: the Hazen scale, which is also known as platinum-cobalt units, is generally used in the determination of color in water samples

Hydrological cycle: water cycle, involving the exchange of water between the atmosphere, water-bodies, the Earth's crust and living organisms. Operates on a global to microcosm level.

Homology: the condition of being homologous. Homologous refers to organs of structures deriving from the same evolutionary origins. For example, the forelimb of a quadruped, the human arm and the wing of a bird are said to be homologous.

Industrial Wastes: solid, liquid and gaseous wastes originating from the manufacture of specific products.

Infant Mortality Rate: the annual number of deaths of infants under one year of age per 1000 live births during a year.

Incinerator: furnace for burning wastes under controlled conditions.

Lichens: species formed from the symbiotic association of algae and fungi. Commonly occur on tree - trunks, old walls, on the ground, exposed rocks. They are the primary colonizers of bare areas.

Landslide: downward mass movement of earth or rock on unstable slopes.

Land Use / Classification: land categories, reflecting quality classes, capability classes or grade, depending upon the characteristics of the land and/or its potential for agricultural use.

Land Degradation: reduction or loss of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest or woodlands resulting from natural processes, land uses or other human activities and habitation patterns such as land contamination, soil erosion and the destruction of the vegetation cover.

Land Affected by Desertification (man made): the area of land which is in the degrading process by the removal of forest vegetation, grassland vegetation and other natural resources.

Lead (Pb): a heavy metal whose compounds are highly poisonous to health. It is used enormous quantities in storage batteries, paints, sheathing electric cables, lining pipes etc. Lead compound is the chief constituent of gasoline and is considered a significant contributor to air pollution.

Life Expectancy at Birth: the expected number of years for a new born baby would live if prevailing patterns of mortality at the time of its birth would remain the same throughout its life.

Labour Force Participation: the ratio of population who are employed and seeking employment in the age group 15-64 to total population in working age.

Literacy Rate: percent literate population 6 years and above. " Literate Person " is the one who can read and write with understanding simple notes of every day life

Monocotyledons: flowering plants having single seed leaf (cotyledon) in the seed.

Major Anions: anions generally found in significant concentrations in natural waters are known as major anions. These include ions of carbonate, bicarbonate, sulphate, and chloride.

Major Cations: cations generally found in significant concentrations in natural waters are known as major cations. These include ions of calcium, magnesium, sodium, and potassium.

Man-land ratio: a measure to express population pressure on land i.e. population divided by land area (sq. km.).

Methane (CH₄): colorless and odorless gas composed of one atom of carbon and four atoms of hydrogen. It is non-poisonous and flammable gaseous hydrocarbon created by anaerobic decomposition of organic compounds. It occurs in natural gas, as fire damp in coal mines, and as a product of decomposition in swamps.

Mercury: heavy metal that can accumulate in the environment and is highly toxic if breathed or swallowed.

Monthly Average Wind Speed (km/hr): average of the daily wind speed in a month.

Monthly Mean Temperature: it is the mean temperature of the month calculated from all daily means of months, where daily mean temperature is the average of maximum and minimum temperature in a day.

Monthly Rainfall (mm): total rainfall in each month of a year.

Maternal mortality Rate: the annual number of deaths of women from pregnancy related causes per 1,00,000 live births.

National Park: A legally established area for the conservation, management and utilization of flora and fauna, and landscape, together with natural environment.

Nutrient: substance, element or compound necessary for the growth and development of plants and animals.

National Accounting: physical and monetary accounts of environmental assets and the costs of their depletion and degradation;

Natural Resources: natural assets (raw materials) occurring in nature that can be used for economic production or consumption. See also renewable natural resources and non-renewable natural resources.

Nitrogen Oxides (Nox): these are compounds of nitrogen and oxygen combined in various ratios. The major human-caused source of NO₂ is fuel combustion in motor vehicles, utility and industrial boilers. The gas is toxic in

high concentrations, a lung irritant and lowering resistance to respiratory infection. It is a major contributor to acid deposition and the formation of ground level ozone in troposphere.

Natural Disaster: sudden calamitous such as earthquakes, tsunamis, floods, volcanic eruptions, cyclones and landslide, of ongoing misfortune as in conditions of processes such as drought and desertification.

Noise: audible sound from traffic, construction and so on that may generate unpleasant and harmful effects (hearing loss). It is measured in decibels.

Normal: The name given to the average value over a period of years of any meteorological element such as pressure, temperature, rainfall, etc. World Meteorological Organization defined the average period as 30 years. Currently 1971-2000 is as the normal period.

Noise Pollution: sound of excessive levels that may be detrimental to human health.

Nutrients: Nutrients include phosphorous, nitrogen, carbon, and silica in their various chemical forms. The degree of eutrophication in lakes is dependent largely on nutrient concentrations in the lake waters.

Nitrates: already cover in Water Resources component. In the context of soil, it is nitrogenous fertilizer in the form of nitrate.

N.P.K. Content in Soil: N.P.K. stands for nitrogen, phosphorous and potassium compounds, which are also called nutrients as these compounds are essential for growing crops and, hence, are added to soil in the form of fertilizers.

Ozone (O₃): pungent, colorless, toxic gas that contains three atoms of oxygen in each molecule. It occurs naturally at a concentration of about 0.01 parts per million (p.p.m.) of air. Levels of 0.1 p.p.m. are considered to be toxic. In the stratosphere, ozone provides a protective layer shielding the earth from the harmful effects of ultraviolet radiation on human beings and other biota. In the troposphere, it is a major component of photochemical smog, which seriously affects the human respiratory system.

Other Lands: this refers to his land type which is catch-all for other uses of land and may include rocky areas, lakes, ponds, water ways or settlements etc.

Ozone Depletion: destruction of ozone in the stratosphere, where it shields the earth from harmful ultraviolet radiation. Its destruction is caused by chemical reactions in which oxides of hydrogen, nitrogen, chlorine and bromine act as catalysts.

Organism: any living plant, animal or human being.

Organic Constituents: there are the substances found in water which have originated from organic sources or which have organic nature (e.g. hydrocarbons, pesticides etc.).

Pesticide: any substance or mixture of substances that is used to prevent, destroy or control pests - including vectors of human or animal disease, and unwanted species of plants or animals. Pesticides may cause harm during, or otherwise interfere with, the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs - or that may be administered to animals so as to control insects, arachnids or other pests in or on their bodies.

Protected Area: a legally established area for achieving specific conservation objectives.

Pteridophytes: non-flowering vascular plants with root, stem and leaves e.g. ferns, horsetails. Widely distributed group attaining its development in the tropics.

Peak Daily Average: the highest 24-hour (daily) average concentration level of average daily concentration levels measured over one year.

Peak 1-Hour Average: the highest one-hour average concentration of all one-hour average concentrations monitored for one year.

Peak 8-Hour Average: The highest 8-hour average of all 8-hour average concentrations measured over one year. p.p.m./p.p.b./p.p.t. (parts per million/parts per billion/parts per trillion), measures of the concentrations of pollutants in air, water, soil, human tissue, food or other products.

pH Value: measure of the acidity or alkalinity of a liquid. A pH value in the range of 0 to 7 indicates acidity, a pH value in the range of 7 to 14 indicates alkalinity, and a pH value of 7 signifies neutrality.

Pollutant: substance that is present in concentrations that may harm organisms (humans, plants and animals) or exceed an environmental quality standard.

Pollution: 1. presence of substances and heat in environmental media (air, water, land) whose nature, location, or quantity produces undesirable environmental effects; 2. activity that generates pollutants.

pH: It is used as a measuring unit of the intensity of acidity or alkalinity of a sample. In other words, the pH is defined as the negative logarithm of molar hydrogen-ion activity or hydrogen-ion concentration (in dilute solutions).

Population Density: total number of inhabitants per square unit of surface area.

Price: The price of a goods or service is the value of one unit of a particular goods or service.

Production: Production is a physical process, carried out under the responsibility, control and management of an institutional unit, in which labour and assets are used to transform inputs of goods and service into output of other goods and service.

Potable Water: water that is safe for drinking and cooking according to defined standards.

Pollution Abatement: technology applied or measure taken to reduce pollution and/or its impacts on the environment. The most commonly used technologies are scrubbers, noise mufflers, filters, incinerators, waste-water treatment facilities and composting of wastes.

Recombination: the rearrangement of genes that occurs when reproductive cells

Red Data Book: a document containing information on threatened, rare or endangered species in a given habitat.

Residual: amount of a pollutant that remains in the environment after a natural or technological process has taken place.

Richter Scale: scale with a range extending from 0 to 10 for measuring the strength of an earthquake.

Rare Species: species occurring in small populations throughout its range. They are sparsely distributed over a large area. They may be endangered or threatened with extinction if their regeneration or reproduction is slow.

Relative Humidity: It is defined as a ratio of actual water vapor pressure to the saturation vapor pressure at the same temperature and is expressed in percentage. It is the measure of the water vapor content in the air.

Sustainable Development: development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). It assumes the conservation of natural assets for future growth and development

System of integrated Environmental and Economic Accounting (SEEA): satellite system of the System of National Accounts (SNA) proposed by the United Nations (1993a) for the incorporation of environment concerns (environmental costs, benefits and assets) into national accounts.

Shrub: low, perennial woody plants with several permanent stems branching from or near ground rather than single trunk, usually less than 6 m high at maturity.

Selection: natural selection is the differential contribution of offspring to the next generation by various genetic types belonging to the same populations.

Species: a group of organisms capable of interbreeding freely with each other but not with members of other species.

Sanitation: improvement of environmental conditions in households that affect human health by means of drainage and disposal of sewage and refuse.

Sewage: organic wastes and wastes water produce by residential and commercial establishments.

Sulphate (SO₄): sulphate ion consists of one atom of sulphur and four atoms of oxygen and carries two negative charge. Sulphur dioxide in the atmosphere ultimately gets converted into sulphate particles, and it combines with moisture in the air to form sulphuric acid (precursor to acid rain).

Sulphur Dioxide (SO₂): A heavy, pungent with suffocating odour, colourless gas formed primarily by the combustion of fossil fuels such as gas, petroleum and coal. It constitutes one of the most troublesome air pollutants. In moist air it is slowly oxidized to sulphuric acid. It is harmful to human beings and vegetation and contributes to acidity in rain. It may be responsible for the decay of buildings and monuments.

Suspended Solid Particles or Suspended Particulate Matter: It consists of particles of a wide range of sizes varying from greater than 100 μm to less than 0.1 μm . Particles larger than 10 μm mainly consists of dust, coarse dirt and fly ashes which settle rapidly. Small particles less than 10 μm remain much longer in the air as Suspended Particulate Matter (SPM). Human - caused sources include a variety of combustion sources (vehicles, dryers), wood stoves, field burning, and dusts from mining, roads and construction. It causes breathing and respiratory symptoms (diseases) and premature mortality. Other effects are soiling and corrosion of building materials.

Soil pH: Already covered in Water Resources component. pH is measured in the aqueous extract of the soil.

Sodium Absorption Ratio (SAR) Component: Already covered in Water Resources.

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

Solid Waste Disposal: ultimate disposition or placement of refuse that is not salvaged or recycled.

Saving: saving is a disposal income less final consumption expenditure (or adjusted disposable income less actual final consumption)

Solid Waste Management: supervised handling of waste material from generation at the source through the recovery processes to disposal.

Tolerance: 1. ability of an organism to endure unfavorable environmental conditions; 2. amount of a chemical in food considered safe for humans or animals.

Threatened: species having low fecundity (offspring production rate) or prone to extinction in human-dominated landscapes.

Toxic Substances: substances, which cause adverse effects on living organisms (e. g. pesticides, arsenic, mercury etc.)

Traffic Density: number of vehicles per km of road length in a given area..

Total Fertility Rate: the average number of children that would be born alive to a women during her life time if she were to bear children at each age in accordance with prevailing age-specific fertility rate.

Turbidity: the presence of suspended and /or colloidal substance give liquid a cloudy appearance, which is, known as turbidity. No health based guidance value for turbidity has been proposed but it makes the water unattractive and possibly harmful.

Taxon (pl. taxa): the named classification unit to which individuals, or sets of species, are assigned, such as species, genus, order etc.

Value added tax (VAT): a value added tax (VAT) is a tax on products collected in spot by enterprises

Vulnerable Species: taxa of various types, including (a) taxa believed likely to move into the "endangered" category in the near future if the relevant causal factors continue to operate. These factors may include overexploitation, extensive destruction of habitat and other environmental disturbances, (b) taxa with populations that have been seriously depleted and whose ultimate security has not yet been assured and (c) taxa with populations that are still abundant but are under threat from severe adverse factors throughout their range.

Weather: day-to-day or sometimes even instantaneous changes of atmospheric conditions over a given place or area. In contrast, climate encompasses the statistical ensemble of all weather conditions during a long period of time over that place or area. Atmospheric conditions are measured by the meteorological parameters of air temperature, barometric pressure, wind velocity, humidity, clouds and precipitation.

Waste-water Treatment: process to render waste water fit to meet environmental standards or other quality norms. Three broad types of treatment may be distinguished.

Water Quality: physical, chemical, biological and organoleptic (taste-related) properties of water.

Water Quality Index: weighted average of selected ambient concentrations of pollutants usually linked to water quality classes.

Wetland: area of low-lying land where the water table is at or near the surface most of the time. Wetlands include swamps, bogs, fens, marshes and estuaries.

Zero Population Growth (ZPG): absence of population growth in which equal birth and death rates create a stable human population.

Appendix - XVI

Technical Committee on 'Environment Statistics of Nepal - 2008'

| Name | Designation | Office | |
|-------------------------|--|--|---------------------|
| Tunga Shiromani Bastola | <i>Director General</i> | Central Bureau of Statistics | Chairperson |
| Uttam Narayan Malla | <i>Deputy Director General</i> | Economic Statistics Division, Central Bureau of Statistics | Member |
| Rudra Suwal | <i>Director</i> | National Accounts Section, Central Bureau of Statistics | Member |
| Sudhir Kumar Koirala | <i>Under Secretary</i> | Ministry of Forests and Soil Conservation | Member |
| Saraju Kumar Baidya | <i>Senior Divisional Meteorologist</i> | Department of Hydrology and Meteorology | Member |
| Ritu Panta | <i>Statistical Officer</i> | Ministry of Environment, Science and Technology | Member |
| Sharad Prasad Joshi | <i>GIS Analyst, Engineer</i> | Water and Energy Commission Secretariat | Member |
| Budhi Narayan Maharjan | <i>Agro. Eco. Specialist</i> | Ministry of Agriculture and Co-operatives | Member |
| Dr. Bishnu Bhandari | <i>CTA</i> | Wetland Project, IUCN | Member |
| Kamala Kanta Lamichane | <i>Director</i> | Environment Statistics and Satellite Accounts, Central Bureau of Statistics | Member Secretary |

Note : Statistical Officers, Mr. Surya Kumar Pandit and Mr. Jay Kumar Sharma assisted to the technical committee.

Contributions for 'Environment Statistics - 2008'

| | |
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| 4 | Dhundi Raj Lamichhane, <i>Director</i> , Central Bureau of Statistics |
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| 6 | Ram Nath Sapkota, <i>Geologist</i> , Department of Mines and Geology |
| 7 | Komal Dahal, <i>Engineer</i> , Department of Water Induced Disaster Prevention |
| 8 | Manju Sharma, <i>Sociologist</i> , Department of Water Induced Disaster Prevention |
| 9 | Suman Raj Aryal, <i>Statistical Officer</i> , Central Bureau of Statistics |
| 10 | Saroj Bhattarai, <i>Statistical Officer</i> , Central Bureau of Statistics |
| 11 | Ganga Ram Sapkota, <i>Statistical Officer</i> , Central Bureau of Statistics |
| 12 | Lila Nath Pandey, <i>Computer Officer</i> , Central Bureau of Statistics |

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