

## 10. Energy and Forestry

### Energy

- 10.1. Energy consumption in FY 2007/08 increased by 2.3 as compared to FY 2006/07 totaling 9,146 Tons of Oil Equivalent (TOE). Consumption during first eight months of the current FY has reached 9,344 TOE.
- 10.2. In FY2007/08, consumption ratio of traditional, commercial, and renewable sources of energy remained at 87.8 percent, 11.5 percent, and 0.7 percent respectively with no change in ratio of consumption of these sources during first eight months of FY 2008/09. It proves the continued high dependency of Nepalese economy on conventional energy source.
- 10.3. In FY2007/08, of the total conventional energy consumption, share of fuel wood, agricultural residues, and livestock residue was 89.2 percent, 4.2 percent, and 6.6 percent respectively. There has been no change in consumption ratio of these sources during first eight months of FY2008/09. Of the total commercial energy source consumed in FY2007/08, Petroleum products (POL), coal, and electricity had respective shares of 64.2 percent, 17.5 percent, and 18.3 percent. Minor change, has however, is in observed in the consumption of two commercial energy sources during first eight months of FY2008/09, i.e. 63.7 percent and 18.8 percent for POL, and electricity respectively with no change in proportion of coal consumption.

### Electricity

- 10.4. By the end of FY2007/08, various hydropower projects generated 650 MW of electricity. Of the total hydropower so generated, 645 MW is connected to the national grid, while rest of the energy generated from small hydropower stations and not connected to the national grid have been providing electricity services at local levels. The total electricity generated has reached 703 MW including 53.41 MW from thermal power stations and 100 KW from solar plants.
- 10.5. By first eight months period of FY2008/09, (79 MW) Middle Marsyangdi Hydropower Project built under the German Government assistance has been commissioned, started commercial production, and connected to national grid. Construction of other two projects, i.e., (30 MW) Chameliya Hydropower Project in Darchula of Far-West Region, and (14 MW) Kulekhani III in Makwanpur are underway. Domestic investment has been garnered to carry out construction of Upper Tamakoshi Hydropower Project, the project is transformed into a company, and construction of access road and other works have started. Humla and Mugu, where solar

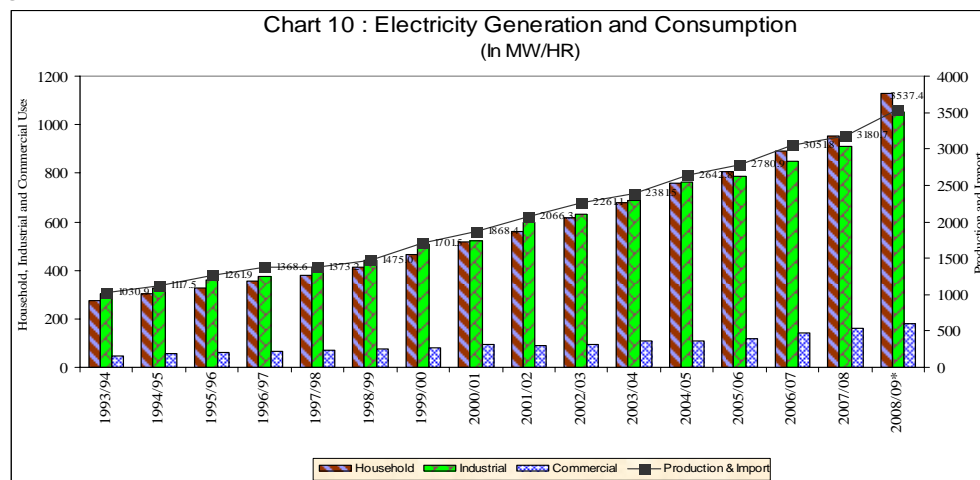
energy has been only source of electricity, construction of (500 KW) Heldung under construction has been completed, while construction of (400 KW) Gamgad is underway for dependable electricity services in those two districts.

- 10.6. Private sector enthusiasm in electricity generation has been satisfactory in FY2008/09 like in previous years. Hydropower projects under construction in the private sector are being completed and brought in operation one after another. In the process, construction of two projects namely (0.996 MW) Pati Khola, and (0.979 MW) Seti II have been completed this year and generating electricity. Hydropower projects under construction and expected to be completed by the end of this fiscal year are: 2.4 MW Ridi Khola; 0.991 MW Upper Handi Khola; 0.99 MW Lower Piluwa Khola; and 2.4 MW Mai Khola. Likewise, Power Purchase Agreements (PPAs) have been completed for 0.980 MW Charanawati, 0.580 MW Golma Gad, 1.850 MW Bhairab Kunda, 9.658 MW Sipring Khola, 9.900 MW Lower Modi I, 0.990 MW Jiri Khola, 0.990 MW Chakey Khola, 5.0 MW Dapcha Roshi, and 0.985 MW Upper Puwa I.
- 10.7. In the process of electrification, 2044.66 Km circuits Km. of 132 kV high voltage transmission lines, 357.96 circuits Km. of 66 kV lines, 9.7 Km. circuits Km. of 66 kV underground lines, and 2550.5 Km. of 33 kV lines are in operation by the end of FY2007/08. In the process of construction of 132 kV 'Ringmen' transmission line for capacity enhancement in Kathmandu valley to cope with ever-growing urbanization, construction of 132 kV Thankot-Chapagaun-Bhaktapur transmission line under the ADB assistance is near its completion. Construction of a (75 Km) 220 kV transmission line is underway under the WB assistance for transmission of electrical energy from the existing Khimti hydropower station and future projects in the periphery. Construction of various 33 kV transmission lines are underway including 90 Km Ilam-Phidim-Taplejung, 50 Km Sitalpati-Musikot, 33 Km Buipa-Okhaldhunga, 70 Km. Chhinchu-Rakam-Jajarkot, 45 Km Ghorahi-Holeri, 90 Km Udipur-Besisahar-Manang, 155 Km Dipayal-Sanfebagar-Manma-Jumla, and 40 Km Dhankuta-Hile-Leguwa-Bhojpur. Studies and preparatory works are underway for construction of 400 kV (75 Km) transmission lines between Duhabi-Jogbani, Butwal-Sunauli, and Dhalkebar-Bhittamod based on principally agreed power exchange capacity enhancement agreement concluded between Nepal and India. The construction work will be carried out in pursuance of planned construction of transmission lines at three separate points between Nepal and India. Out of these three, works are underway for construction of Dhalkebar - Bhittamod transmission to start in FY2009/10 and complete by FY2010/11.

- 10.8. The Government of Nepal and Nepal Electricity Authority (NEA) are carrying out electricity distribution works in all electricity accessible districts from their own sources. Both Phase I and II of Electrification in Kailali and Kanchanpur has been completed under the assistance of the Government of Denmark. In addition, electrification is completed in additional locations of 27 districts under the assistance of Asian Development Bank (ADB). Electrification started in additional locations of Bhaktapur, Lalitpur, Nuwakot, Dhading, and Kavrepalanchok districts through the World Bank assistance is continued with the target of completion in FY 2009/10.
- 10.9. Rural electrification work is in progress in participation of 149 community-based institutions with a target of providing access of electricity to 135,000 household. This is an activity carried out under the community-based rural electrification expansion program.
- 10.10. A number of activities are underway for hydropower feasibility studies and preparing detailed study reports. Studies for identification of other feasible projects towards meeting the energy demand are also continued. Efforts are underway for garnering resources for detailed study of storage type 127 MW Upper Seti Hydropower project, as immediate execution of such a project is felt necessary to remove the present demand and supply imbalance in national electricity supply system caused by seasonal variation. Bids are invited for construction of Upper Trishuli (A), while feasibility study is continued on Upper Trishuli (B) hydropower project. An updating study is being carried out on Rahughat Hydropower Project proposed for construction through Indian assistance. Detailed studies initiated on some other attractive storage-type projects like Nalsiaugad, Madiishaneshwor, and Seti-Trishuli.
- 10.11. A total of 3,180.66 Gega Watt Hours (GWH) of electricity was supplied in FY2007/08 comprising 1,798.61 GWH from hydro-electricity, 9.17 GWH from thermal, 960.47 GWH purchased from the private sector, and 412.41 GWH imported from India. Of the total electricity thus supplied in the same year, 2287.41 GWH was consumed domestically while 61.5 GWH was exported to India. According to estimates for FY2008/09, available electricity will total 3,537.41 GWH comprising 2,828.934 GWH from hydropower plants, 14.5 GWH from thermal plants, and 684.0 GWH import from India. Of the total availability, 2,666.6988 will be consumed domestically and 54.0 GWH export to India.
- 10.12. In FY 2007/08, consumption of electricity on sector basis industries consumed 39.2 percent, household 40.4 percent, commerce 6.6 percent, non-commerce 4.6 percent and miscellaneous 9.2 percent. Such ratios in FY

2008/09 estimated for industry, household, commerce, non-commerce, and miscellaneous sectors are 38.1 percent, 41.7 percent, 6.8 percent, and 13.4 percent respectively.

- 10.13. The numbers of electricity consumers are growing annually. By the end of FY2007/08, the number of customers grew by 9.1 percent totaling 1 million, 524 thousand 610. In FY2008/09 total number of electricity customers is estimated to reach to 1 million 677 thousand by recording 10 percent growth.



## Petroleum Products

- 10.14. In FY 2007/08, consumption of petroleum products recorded a decline of 6.97 percent totaling 627,701 Kilotitre (KL). In the meantime, however, consumption of LP gas had increased by 3.5 percent reaching 96,837 metric ton. Consumption of these two products in first eight months of FY2007/08 had totaled 420,417 KL, and 62,964 Metric Tons respectively while consumption of petroleum products during the same period of FY2008/09 increased by 2.7 percent totaling 431,745 KL, and that of LP gas recorded a surge of 16.9 percent reaching 73,618 MT.
- 10.15. Diesel, kerosene, petrol, and aviation fuel occupy major shares in consumption of petroleum products. Diesel, kerosene, petrol, and aviation fuel among petroleum products consumed in FY 2007/08, except LP gas, shared 48.2 percent, 24.7 percent, 16.1 percent, and 10.9 percent respectively. Observation of consumption of these items during first eight months of FY2008/09 reveals that the proportion of diesel, petrol, kerosene, and aviation fuel consumption stood at 59.8 percent, 17.6 percent, 11.5 percent, and 11.1 percent respectively.

- 10.16. Nepal Oil Corporation is engaged in sale/distribution of petroleum products in required quantities throughout the country by importing and storing as necessary. Homework is underway for the supply of petroleum products by laying pipeline between Raxaul depot of Indian Oil Corporation in India, and Amlekhganj depot of Nepal Oil Corporation in Nepal for facilitating distribution of petroleum products. In addition to capacity enhancement of existing depots and construction of new depots, initiation is made for implementation of recommendations pertaining to structural reforms made by various Commissions /Committees formed in preceding years.

### **Coal**

- 10.17. Consumption of coal in FY2007/08, as compared to the previous fiscal year, totaled 185 TOE with an increase of 28.1 percent. Consumption has gone up by 13.2 percent reaching 187 TOE during first eight months of FY2008/09 as compared to the same period of FY2007/08.

### **Alternative Energy**

- 10.18. The Government of Nepal has established Alternative Energy Center (AEPC) with multiple objectives of fulfilling energy supply in rural areas through development of alternative /renewable energy technology; improving socio-economic condition of rural people through operation of cottage industries and micro-enterprises by using energy technology; maintaining regional balance; and reducing the environmental impact emerging in rural areas due to excessive deforestation. In order to meet these objectives, the Center has been carrying out a number of activities including necessary help and advisory services to the government in developing energy technology policy; developing short and long-term plans; implementing programs by maintaining coordination with energy related organizations/institutions; and maintain quality control, monitoring and evaluation etc.
- 10.19. Rural Energy Fund is established under the AEPC and in operation for mobilization of financial resources received from the Government of Nepal, Norwegian, and Danish Governments for solar energy and micro-hydro projects in a well-managed, simplified, and efficient manner. The fund is also meant for maintaining coordination with banks for arranging loans. Establishment of the fund has enhanced access of people to new and sustainable energy systems in rural areas not connected by the national transmission grid thereby improving their living condition through improvement in their health and education and direct support to income generation and employment. Likewise, the center with the help of KfW of Germany, has established a credit unit and providing credit with the

objective of helping low-income people to install bio-gas plants. The Government has been providing subsidy, and customs duties and VAT relief on imports of renewable energy related equipment. Beginning this fiscal year, duty relief is being provided for solar energy equipment imported for urban solar homes electrification under the urban solar electrification program .

- 10.20. AEC, upon identification of high wind pressure areas in a number of districts and installation of data loggers, has been collecting wind data. Preparation of wind energy policy is in final stage for managing development and expansion of wind energy based on those data.
- 10.21. There is enormous potential for uses of various renewable energy sources including biogas, micro-hydropower, solar energy (photovoltaic and thermal), improved water mills, improved cooking stoves and wind energy etc. The Government of Nepal, since the year 2000 AD has been providing subsidy for the promotion and development of rural energy for improving the living standard of low-income rural people through maximum utilization of this source of energy. Process initiated for the approval of subsidy working procedures for execution of Energy Subsidy Provision 2008 by revising earlier Renewable (Rural) Energy Provision 2006. Objectives of amendment in existing policy provision are for enhancing development effectiveness; bringing simplicity in services and efficiency; increasing accessibility of socially backward and rural poor; making subsidy arrangement proportional, inclusive, and effective; and adjusting inflation to subsidy.
- 10.22. Amidst absence of a comprehensive a national policy for promotion and development of alternative and rural energy in Nepal, Rural Energy Policy 2063 (2006) is in implementation for supporting poverty reduction initiative for appropriate development and expansion of rural energy. In pursuance of this policy till last year, Rural Energy Development Sections in 25 District Development Committees were established and functioning through financial support of UNDP and World Bank under the Rural Energy Development Program (REDP). Now, the program is expanded in 40 districts and those sections in each DDC transformed into District Energy and Environment Unit.

**Table 10 (a) : Status of Alternative Energy/Bio Gas**

S.N.	Activity Description	Progress in first 8 months of FY 2008/09
1.	Distribution of Solar Drier/ Cooker (Nos.)	178
2.	Biogas Plants Installed (Nos.)	1,319
3.	Improved Cooking Stoves (Nos.)	9,863
4.	Home Solar Energy System Installed (Nos.)	39.480
5.	Improved Water Mills Installed	673
6.	Micro-hydro electricity production (kW)	2,721

Source : Alternative energy promotion center

- 10.23. Currently, operation, promotion, and expansion of AEPC activities are being carried out as per the Alternative Energy Promotion Development Board Rules 2054 (1997), which required to be updated in line with changing times. Accordingly, two separate Rules namely, Alternative Energy Promotion Development Board Personnel Services Rules (2007), and Financial Rules 2064 (2007) have been drafted with approval under process.

### Forestry

- 10.24. The Government of Nepal has adopted its forestry management policy with multiple objectives like: (1) maintain environmental balance by conservation of forests, vegetation, watershed, and biodiversity; (2) Ensure sustainability of forestry products of conserved forests, and ensure social empowerment, gender equity, social justice, equality and good governance; (3) Encourage promotion of forestry based industry and entrepreneurship thereby creating employment opportunities for economic and social progress of ultra poor and oppressed by ensuring their accessibility and rights on forests; (4) Develop internal market and promote export for raising income level of backward class of people, *Dalits*, Indigenous, *Ethnics*, *Madhesis*, oppressed, handicapped and others left behind; and ultimately (5) Support equitable development while contributing to poverty reduction through implementation of judicious distribution system of forestry products.

<b>Box 10 (a):Forest Resource Data</b>	
Forest Area	4.27 Million Ha. (29 percent)
Bush and Shrubs	1.56 Million Ha. (10.6 percent)
Total Stem Volume	388.0 million Cubic Meter
Shorea Rubusta (Sal) in Total Volume	28 percent
Total Biomass	429 Million Ton
Average Stem Volume	178 Cubic Meter per Ha.
Numbers of Average Trees	408 per Ha.

Source: Ministry of Forests and Soil Conservation

- 10.25. Ministry of Forests and its related departments have continued to carry out various projects and programs every fiscal year through internal resource and foreign aid as per 6 primary and 6 support programs set by Forestry Development Master Plan for long-term development of forestry sector. Altogether, 22 programs and projects are ongoing in various districts including National and Leasehold Forestry, Community and Private Forests, Ecological system and Genetic Resources Conservation, Soil Conservation and Watershed Management, Herbs and Aromatic Plants, and other forestry products related programs.
- 10.26. Altogether 29,025 square kilometers (19.7 percent) land area comprising National Parks, Wildlife Conservation, Protected Areas, Games Conservation, and Buffer Zone has been declared as protected areas and are being managed accordingly.

<b>Box 10 (b):Forestry at a Glance</b>	
<b>Community forestry</b>	
Number of Community Forest User Groups	14,559
Area of Handed Over Community Forests	1.23 million Ha.
Number of Beneficiary Household	1.66 Million
Number of Women managed Community Forests	795
<b>Leasehold Forestry</b>	
Number of Leasehold Forests User Groups	4194
area of Handed Over Leasehold Forests	23,423 Ha.
Beneficiary Households of Leasehold Forests	36,478
<b>Partnership Forestry</b>	
Demonstration Program Operating Districts	Bara, Parsa, Rautahat, Mahottari
No. of Partnership Forests	4
Areas of Partnership Forests (Ha)	Bara 2,058; Parsa 3,138; Rautahat 1,473; Mahottari 2,006.

Source: Ministry of Forests and Soil Conservation

- 10.27. So far 1.230 million hectares of forest area has been handed over to 14559 Forest User Groups (FUGs) formed under the Community Forestry Program directly benefiting 1.66 million households. By mid-March of FY2008/09, the Project has achieved 82 percent progress against the target set for the current fiscal year.
- 10.28. So far 23423 hectare forest has been handed over to 4194 FUGs formed under the Leasehold Forestry and Livestock Development Program directly benefiting 36478 households. By mid-March of FY2008/09, the Project has achieved 85 percent progress against the target set for the current fiscal year.

- 10.29. Five-year work plans for four Partnership Forestry Program covering 8675 hectares forest area have been approved so far. It has directly benefited 87,815 persons. The ongoing biodiversity program in Terai and Shiwalik area has achieved 88 percent progress by mid-March 2009 against the target set for current fiscal year.
- 10.30. A total of 247 Buffer Zone forests have been handed over under the Buffer Zone Management Program, and 380 such forests are proposed for management so far. The project has benefited a total population 714098 of 112,125 households residing around protected areas.
- 10.31. Ward-level group-based organizations formed in 8 Wards under the District Soil Conservation, and Community Development and Forest Watershed Conservation Program have directly benefited 695 households so far. Soil and Watershed Conservation Program has achieved 82 percent progress by mid-March 2009 against the target set for current fiscal year.
- 10.32. Emphasis is given on plant research and development for herbs production, processing, and marketing management in cooperation with the private sector for creating employment opportunities, export promotion, as a major source of income generation in Himalayan and mountain regions. For this, attention will be paid in conducting appropriate technology-based research, and collection of data for conservation and sustainable management of important herbs from extinction.
- 10.33. Policy is pursued for establishment and expansion of protected areas as necessary for biodiversity conservation that best represents nation's ecological system. In addition, the policy will also focus on: (a) preparation and implementation of management plan for sustainable conservation of biodiversity in protected areas; (b) Preparation of policy for conservation of rare species and make necessary arrangement for protection, enhancement and improvement of their habitats; (c) Operation, protection and management of genetic corridors and connectivity; (d) Manage ecological processes in natural way, and make ecological services more mankind friendly; and (e) mobilize public participation for conservation by encouraging sustainable utilization of biodiversity and natural resources through research. In the current fiscal year, 1500 hectare or 15 square kilometer area of Nagarjun under the Shivapuri National Park, and 700 hectare or 7 square kilometer area of Rabaiyapur, Bardiya are declared as protected areas.

Two landscape conservation programs, namely Terai Arc Landscape program comprising middle and western Terai, and Sacred Himalayan Landscape Conservation Strategy by including eastern hilly region, have been prepared for conservation of biodiversity, and conservation of genetic

resources through sustainable management of ecology. By mid-March 2009, Terai Arc Landscape and Western Terai Complex Landscape Program have achieved 85 and 86 percent of their respective targets for current fiscal year.

- 10.34. Nepal, as a party to International Agreements/Conventions on biodiversity and environmental protection, has been carrying out wildlife husbandry, breeding, and research works right from policy level for effective implementation of those Agreements/Conventions by engaging NGOs, organizations/institutions and persons for increasing employment opportunities through sustainable protection, growth and utilization of wildlife. So far nine important Wetlands have been listed in Ramsar Index including *Kosi Tappu, Bees Hajari Tal, ghoda Ghodi Tal, Jadishpur Tal, Gokyo Tal, Gosain Kunda, Se-Phoksundo Tal, Rara Tal* and *Mai Pokhari* for Wetland Conservation. Conservation and Sustainable Use of Wetlands Project is ongoing for management, development, and conservation of Wetlands.
- 10.35. Out of 11.5 million saplings targeted to be produced in FY2008/09 based on locally demanded species, and seeds collection, work on producing 13.2 million saplings of various species including herbs has been going on by mid-March 2009.
- 10.36. According to National Parks and Wildlife Conservation Act 2029 (1973), 27 mammal, 9 bird, and 3 reptile species have been included in protected wildlife. With the objective of diversification of wildlife habitat, so far relocation of 87 rhinoceros from Chitwan to Bardiya and Shuklaphanta; 19 barking deer from Godavari to Shivapuri; and 81 spotted deer from Godavari to Parsa is completed.
- 10.37. Management Plan for all National Parks and Reserves has been prepared and being implemented for sustainable managements of biodiversity, genetic resource conservation, and ecological system. Protective Work plan for conservation of rare wildlife like Rhinoceros, Tiger, and Snow Leopard prepared and put in implementation. Buffer zone management program is ongoing in 11 protected areas.
- 10.38. Study is conducted on the contribution of the Forestry Sector to GDP. The study report concluded that the direct and indirect contribution to Forestry Sector account to 9.4 percent and 18.1 percent respectively totaling 27.5 percent (Forest Resources and Survey Department, 2007).
- 10.39. Bamboo and rattan (cane) occupy important place in micro forest products. National policy on cane and bamboo has been prepared with the objective of raising people's income level by creating employment opportunities through cane and bamboo farming, and its sustainable management.

- 10.40. A new report has identified Genus species of flowering plants for the first time in Nepal in process of conducting detailed research on herbarium plant samples preserved in national herbarium within the last two years. In addition, among non-flowering plants, out of 21 species of *Yarchagumba* mushroom, its two sub-species were found namely, *Isaria nippanica* and *Isaria tenuipes*
- 10.41. As a party to biodiversity and environmental protection related International Agreements /Conventions like CBD, CITES, Ramsar, wildlife husbandry, breeding, and research works are allowed for effective implementation of those Agreements/Conventions by engaging NGOs, organizations/institutions and persons for increasing employment opportunities through sustainable protection, growth and utilization of wildlife. Policy is adopted for working towards appropriate management and growth of elephant, specie in peril, by maintaining elephant shelter (barn); and effectively operating elephant, and crocodile sub-species breeding centers located within National Parks and Reserves. Likewise, policy is adopted to permit NGOs or other organizations in managing conservation areas without compromising upkeep of environment and biodiversity. Another policy adopted is to carry out reconstruction of physical infrastructures destroyed during the conflict for effectively managing Parks and Reserves; and carry out conservation and community development programs through the management of buffer zones.

**Table 10 (b):National Parks at a Glance**

S.N.	National Parks	Declared Year	Area (Sq. Km)
1	<i>Chitwan National Park</i>	1973	932
2	<i>Langtang National Park</i>	1976	1,710
3	<i>Sagarmatha National Park</i>	1976	1,148
4	<i>Rara National Park</i>	1976	106
5	<i>She-Foksundo National Park</i>	1984	3,555
6	<i>Khaptad National Park</i>	1984	225
7	<i>Bardiya National Park</i>	1988	968
8	<i>Makalu Barun National Park</i>	1991	1,500
9	<i>Shivapur National Park</i>	2002	144
<b>Total</b>			10,288

**Table 10 (c): Wildlife Reserves at a Glance**

Reserves	Declared Year	Area (Sq. Km)
<i>Shuklaphanta Wildlife Reserve</i>	1976	305
<i>Koshi Tappu Wildlife Reserve</i>	1976	175
<i>Parsa Wildlife Reserve</i>	1984	499
<i>Dhorpatan Game Reserve</i>	1987	1,325
<b>Total</b>		23,04

**Table 10 (d): Conservation Areas at a Glance**

<b>Conservation Area</b>	<b>Declared Year</b>	<b>Area (Sq. Lm)</b>
<i>Ananpurna Conservation Area</i>	1992	7,629
<i>Kanchanjangha Conservation Area</i>	1997	2,035
<i>Manaslu Conservation Area</i>	1998	1,663
<b>Total</b>		11,327

**Table 10 (e): Buffer Zones at a Glance**

<b>Buffer Zone</b>	<b>Declared Year</b>	<b>Area (Sq. Km)</b>
<i>Chitwan National Park</i>	1996	750
<i>Bardiya National Park</i>	1996	328
<i>Langtang National Park</i>	1998	420
<i>She-Foksundo National Park</i>	1998	1,349
<i>Makalu-Varun National Park</i>	1999	830
<i>Sagarmatha National Park</i>	2002	275
<i>Shuklaphanta Wildlife Reserve</i>	2004	243.5
<i>Koshi Tappu Wildlife Reserve</i>	2004	173
<i>Parsa Wildlife Reserve</i>	2005	298.17
<i>Rara National Park</i>	2006	198
<i>Khaptad National Park</i>	2006	216
<b>Total</b>		5,079.67