

## 2.2.3 The Impact

**Forest Depletion:** Forests have three important functions: production of goods and services, protection of natural environment, and regulation of atmospheric conditions, i.e., absorption of greenhouse gases (GHGs). The production function promotes economic development and enhances economic benefits for community, while protection and regulation functions help to improve and/or maintain ecological balance. Human and livestock activities have degraded forests and a number of environmental problems have emerged. The impacts of deforestation are summarised as follows:

**Forest Structure:** Decline in forest area from 37.4 per cent in mid-1980s to 29 per cent in 1994 and corresponding increase in the area of shrub land from 4.8 per cent to 10.6 per cent during the same period indicates the change in forest structure. The inventory of forests shows that the growing stock of forests has decreased in all three physiographic regions. In 1985-86, the total growing stock was estimated at 522 million m<sup>3</sup> over bark up to 10 cm top diameter, which dwindled to 387.5 million m<sup>3</sup> in 1999, i.e., growing stock declined by over 25 per cent (HMG/ADB/FINNIDA, 1988; DFRS, 1999).

**Biodiversity:** Although a population census of biological species has not been carried out, inclusion of the increasing number of plants from 13 plant species in 1996 to 18 plants in 2001 under the forest laws indicates the pressure on plant resources and realisation of the need for protecting them (Annex 2). Similarly, a number of wild animals have been considered endangered. The habitat alteration from grassland ecosystem to woody vegetation may have also affected wildlife in the protected areas.

Furthermore, a total of 60 non-endemic and 47 endemic plant species have been documented threatened (Shrestha and Joshi, 1996). In comparison to the world's threatened list of wild animals, Nepal's threatened mammals and birds constitute 3.8 per cent and 2.2 per cent respectively (Table 2.13).

Groups	World	Nepal
Invertebrates	2,754	2
Reptiles	316	9
Birds	970	21
Mammals	741	28
<b>Total</b>	<b>5,929</b>	<b>60</b>

Source: Uprety, 1998

Similarly, inclusion of plants reported in Nepal in the CITES appendices and IUCN Red List also indicates the severe pressure on Nepal's wild species of flora and fauna (See Table 2.12; Annex 1).

**Ecosystem:** Natural and deforestation induced soil erosion, landslides, and floods have affected forest structure, and sedimentation of important ecosystems, both terrestrial and aquatic ecosystems.

The occurrence of floods and landslides as a result of deforestation has affected not only the degradation of land but also human lives and property. Over 1300 persons died during the 1993 flood alone. It is estimated that the 1993 flood converted land used

Year	Total financial loss*(US\$ '000)	Degraded land area (ha)

flood converted land used for different purposes into 5,580 ha of degraded land (Table 2.14). Data shows that about 42 thousand ha was converted to degraded area in 1995 alone. The consequences of floods and landslides have direct effect on forest production, and its regeneration potential.

1984	2,050	1,240
1990	1,502	1,130
1991	494	280
1992	252	140
1993	99,110	5,580
1994	1,192	390
1995	-	41,870
1996	208,787	7,793

Source: MOHA, 1999; DPTC, 1997.

\* Includes loss of livestock, agriculture land, houses, roads, etc

**Overgrazing:** Dwindling forest growing stock and increasing number of livestock has increased pre-grazing and overgrazing. This may have compacted the soil due to a high number of livestock being in a small area, and accelerated surface run-off and soil erosion.

**Fire:** The felling of green trees is prohibited to extract forest products such as timber and firewood. Hence, some people intentionally start forest fires to meet their energy needs. It has been estimated that 64 per cent of the forest fires are intentionally set-off by people living in settlements nearby forests.

**Atmospheric Change:** Burning fuelwood has degraded indoor air quality in many village households due to poor ventilation and traditional inefficient combustion practices. Pandey et al (1985) found a strong correlation between chronic bronchitis and decline in lung functions, and biomass burning, particularly in rural women of the Hills and the Mountains. Furthermore, carbon dioxide (CO<sub>2</sub>) emission (a greenhouse gas) from biomass burning and deforestation has increased in the atmosphere. This increase in CO<sub>2</sub> has also increased the amount of radiant energy, thereby warming the local climate.

It is estimated that the annual deforestation of 26,602 ha has emitted 7.77 million tonnes of carbon into the atmosphere (SEAMCAP, 2000). Fuelwood burning has also considerably emitted other pollutants such as TSP, HC, NO<sub>2</sub>, and SO<sub>2</sub> into the atmosphere (Table 2.13).

Table 2.13 Estimated Emission (tonnes/year) from Fuelwood Use

Year	TSP	CO	HC	NOx	SOx
1980	138,749	346,872	309,583	10,406	5,203
1985	178,913	447,282	399,199	13,418	6,709
1990	197,579	493,949	440,849	14,818	7,409
1995	221,867	554,667	495,040	16,640	8,320
1998	236,677	591,692	528,085	17,571	8,875

Source: UNEP, 2001

**Accessibility:** Forest depletion has made forest areas far from settlements and local inhabitants have to spend more time fetching firewood and fodder. In other words, the distance travelled by rural people to reach the forests has increased considerably, resulting in reduced time available for other productive activities. However, the increased production in community forests has saved 3.625 hours/family/day in some areas (Roy, 1999).

**Export of Forest Products:** Till the mid-1970s, a significant amount of revenue was generated from the export of forest products, particularly timber. Timber export reached a maximum of about US\$ 28 million in 1975 and then declined sharply to a minimum of US\$ 0.1 million in 1981 (MOF, 1999). Because of decline in forest area, HMG banned timber export since 1984. Similarly, the value of non-timber exports was US\$ 5.6 million in 1980 and declined to US\$ 2.7 million in 1998.

**Forest Soil Nutrients:** Forests and the agricultural system have a close linkage. Most of the fertile farmlands are in the valley floor or at the foothills. During the first rainfall, the valley floor croplands receive a good amount of nutrient rich forest leaves (humus) and soil fertility is maintained as people divert such floodwater to their farmland. However, forest depletion and monoculture plantation in the hills has resulted in the decline of the accumulation of nutrient rich humus, and soil fertility is deteriorating. This may be one of the reasons for adding more chemical fertilisers to the farmlands. This has increased expenses for maintaining crop production.

In areas where monoculture plantation prevails, there is a deficiency in forest nutrients and it has affected both forests and agricultural system. This nutrient transfer and loss has yet to be studied in detail.

**Drying-up of Water Sources:** Forest depletion, and conversion of broad-leaved forests to needle-leaved forests or shrub lands has increased drying-up of springs and wells, particularly in the Hills. Due to this reason, local people have to spend more time fetching drinking water. However, forest protection, plantation and regeneration and expansion of community forestry have shown positive impacts on the re-sprouting of springs.

The above impacts are pronounced on Nepal's agricultural and forestry sectors. Realising these problems, HMG has expanded activities to conserve natural resources and to improve the living standard of the local people who are both the beneficiaries and victims of these rural environmental problems.