CHAPTER II

PUNJAB ECOLOGY:
A TEMPORAL-SPATIAL VIEW

Pre-Colonial Period
Colonial Period
Post-Colonial Period
There is a general tendency to associate any ecological damage with the recent development process. The present study, however, holds a different viewpoint. It believes that every region has an ecological history and any damage to ecology has to be interpreted at three levels. First, an area may be ecologically disadvantaged by reason of its inherent physical conditions, such as, subsurface salinity of water in Haryana. Secondly, an area may have been subjected to an impact by some historical events. For example, deforestation during the colonial time caused extensive soil erosion on the Morni hills in Haryana. Finally, the ecology of an area may have been impacted upon by some recent developments. Quarrying near Delhi, in Haryana, causing dust pollution is one such case (Sangwan, 1991, pp.200-203).

In this light, it becomes necessary to take a note of the ecological history of Punjab in a spatial perspective. For convenience of discussion, the ecological history is organised into three periods : the pre-colonial (prior to 1849, when the British took over Punjab), the colonial (1849 to 1947) and the post-colonial (post 1947, when India became Independent). The treatment of the last phase here is limited upto 1966 as the later developments are detailed in the chapters to follow.

The Pre-Colonial Period

Punjab was a scene of one of the most ancient river valley civilisations, the Indus, which dates back to about 2750 B.C. There is ample evidence to suggest that forests existed here in
far greater abundance than at present. This facilitated the use of burnt bricks in place of sun-dried bricks. The available timber was liberally used for the purpose (Piggott, 1950, p.137). It caused considerable deforestation and devastating floods, and, according to one theory, the loss of this civilization is attributable to this factor.

Punjab moved on to a rural based society and economy after the end of the Indus valley civilisation, some time during 1700 to 1500 B.C. Most of the population was concentrated in the riverain tracts. The yearly deposit of alluvium and easy water supply made cultivation possible in these floodplains.

The discovery of iron around 1000 B.C. enabled the people to push inland. Iron implements were in use by that time to clear vegetation and extend cultivation. Areas with adequate rainfall and abundant water supply were favoured. The interiors of the interfluvial tracts were settled in the process.

Subsequently, artificial irrigation came to be practised with the help of wells in the foothill zone as also in the river valleys. Wells at that time were just holes in the ground where water table was two to six metres deep. Further away from the rivers, where the water depth went down to 7 to 21 metres, wells with masonry lining were found (Trevaskis, 1928, pp. 9-11).

Irrigation received a boost around the 13th century A.D. when the persian wheel became increasingly popular in Punjab
Irrigation was further augmented with the construction of the Shah Nahr by Shah Jahan in the 17th century. Historically, the Majha and the Bist doab regions were a greater beneficiary of the extensions in irrigation through wells or canals.

Forests during the time of the Sultans (1206-1526) were more widespread than at the time of the Mughals (1526-1761). There was a better supply of firewood and timber to villages during the pre-Mughal period (Nijjar, 1968, p.124). Most of the villages were surrounded by a forest from which they could get firewood or other such produce.

Periodic but regular invasions from the northwest had an adverse impact on the ecology. The associated disturbances forced people to take shelter in inhospitable tracts. A clear example of this is provided by the anarchy and turmoil in Punjab during the eighteenth century. The Sikhs were a hunted lot at that time. They took refuge in forests and engaged in guerrilla warfare. Some new areas were opened up for cultivation. The combined effect of these two factors damaged the forests and the wildlife (Gupta, 1952, p.28).

Besides the human impact, some ecological changes took place due to the initiation of a phase of desiccation. The southern parts of Punjab were affected in particular. Several ruins are found along the dry bed of the Ghaggar river, which marks the southern boundary of Punjab.
Desiccation represents a deterioration in the conditions of water supply in a region. The cause for the above mentioned desiccation was initially stated as the change in climate (The Pioneer, 1874, p.2). Piggott (1950, pp.134-136) subscribes to the same view. He observes that the change in climate was related to a general eastward shift of the southwest monsoon zone.

Some scholars link this desiccation with the changes in the hydrology of the region. The Ghaggar, which was a perennial river, became a seasonal one consequent upon the capture of its tributaries by the Indus system, as well as by those of the Yamuna.

The process of desiccation got accentuated by deforestation in the Siwalik hills and the ensuing soil erosion. Also, sands from the abandoned courses of some rivers, such as the Satluj, got scattered over the once fertile lands. Over-grazing and over-cultivation are also said to have contributed to the desiccation of this region.

Thus, we observe that the impact on the environment during this period took place over millennia and it was mostly in the shape of deforestation. This was mainly for extension of cultivable land. A phase of any unsettled political conditions was also detrimental to ecology. People sought refuge in forested areas and disturbed the fragile ecological balance. Above all, a phase of desiccation, associated with a change in climate and shifts in river courses, was also responsible for causing a
damage to the Punjab ecology. Nonetheless, all these changes were spread over a long period of time and their effect was far from dramatic. Population growth was slow and had not started exerting its pressure on resources.

The Colonial Period

The coming of the British gave a new turn to the history of Punjab. An era of political stability ensued and developmental activity was started which was advantageous to colonial interests. This impacted upon the ecology.

The period witnessed an introduction of a relatively advanced technology. Extensive canal systems were raised and agricultural frontiers extended. Railways were laid and some industry got established. There was a greater use of wood for construction and as an industrial fuel.

Canal Irrigation

After their colonisation of Punjab, the British followed a policy of rapid agricultural development. Canal irrigation was a primary input for that purpose. The Upper Bari Doab Canal was the first one to be built in 1860-61. It principally aimed at generating employment to rehabilitate the disbanded Sikh army personnel. It took off from the Ravi at Madhopur to irrigate 526,084 hectares in the districts of Amritsar, Gurdaspur and Lahore, the last district now being a part of Pakistan.

The Sirhind Canal was completed by 1887. It irrigated 728,424 hectares in the districts of Firozpur, Ludhiana and
parts of the princely states of Patiala, Nabha, Faridkot, Jind, Malerkotla and Kalsia.

The introduction of canal irrigation had a two-fold effect: (i) it extended cultivated land at the expense of the forest land, and (ii) it caused waterlogging and salinity. These changes were first experienced in the area under the command of the Upper Bari Doab Canal. The water table in Amritsar district rose by 5 meters in a span of about fifty years from 1865 to 1914. In 1925, the water table level was only 2.4 to 3 metres below the surface in the Amritsar district (Darling, 1947, p.72). Another consequence of this rise in the water table was the spread of malaria. The fever raised the morbidity level and caused mortality in several cases.

Deforestation

It is notable that factors leading to deforestation in the colonial days contrasted with those during the pre-colonial period. In the latter case, it was war and turmoil which led to the loss of forests; in the former situation, it was peace which led to the clearance of several forested pockets for agriculture, industry and construction. The evolving scenario also led to a regular growth of population. This, in turn, intensified pressure on agricultural land and impelled encroachment on forests.

Construction of canals also required clearance of forest pockets. Increased agricultural productivity through irrigation stimulated extension of agricultural land, primarily at the
cost of forests. Forest cover was under attack for various reasons.

Punjab had several rakhs (wastelands) during the British period (Government of Punjab, 1883-84, p.3). These were thickly wooded, mostly with dwarf trees and brushwood. Gradually a great reduction was experienced in their number and extent. In Amritsar district, for instance, the area of these rakhs had shrunk considerably between 1860 and 1883-84. This was due to construction of canals and subsequent spread of cultivation. Rakhs were exploited also for supplying wood and fodder to the military farms. Some of these were distributed as bravery awards to native officers of the imperial army. This again saw their conversion into agricultural land. By 1914, the district presented a sparsely wooded appearance (Government of Punjab, 1914, p.1). By 1947, no forest worth its name existed in the district (Government of Punjab, 1947, p.162).

A similar experience of deforestation was typical of the Bist doab. The region was known as the 'Garden of Punjab' by virtue of its fertile soils, fairly good rainfall and well irrigation (Banga, 1978). Its ecological personality changed over time.

A great damage to ecology was caused by deforestation in the Siwalik hills. These hills were originally covered by a scrub jungle and were used by the local princes as hunting preserves. On acquisition of these hills by the British, the
land was allocated to various villages and the brushwood and minor forests were declared to be their property (Punjab State Archives, 1879, p.2). The fact that an open mine of wealth existed in the shape of woods for anyone to tap and a new market became available in the form of demand from the Public Works Department, railways and urban industry, the temptation to exploit the forests was great. Soon, the hillsides were stripped of their cover. Wood for construction was supplied to the Railway Company and the Sirhind Canal Works. Firewood was supplied to the towns of Garhdiwala, Dasuya, Hariana and Hoshiarpur and fuelwood to the industrial units.

In a government enquiry at that time, it was ascertained that in 19 villages of the tract, 915 persons were making their livelihood by cutting and selling firewood. The jungle at this time was sold very cheaply and a banyan tree, a hundred years old, was sold to a charcoal burner for just one rupee. The glass manufacturing industry near Dasuya also consumed large quantities of firewood (Punjab State Archives, 1879, p.7).

As a result of this denudation, there was a loss of top soil. Shorn of their vegetative cover, these hills became highly fragile under any action of water. Soil erosion became rampant.

One consequence of all this was a change in the character of choes (seasonal streams) emanating from the Siwalik hills. These choes were originally not destructive. Their contribution to the soil fertility and moisture in the plains was signifi-
cant. Due to the denudation, these developed a tendency to expand their beds horizontally in the soft strata rather than to cut deep vertically. Loose sand from the hills was also carried by these onto the fertile soil cover in the adjoining foothill zone.

The area under choes in Hoshiarpur district was 19,508 hectares in 1852; that in Jalandhar district was 303 hectares in 1851. By 1884-86, the figures for Hoshiarpur and Jalandhar were 32,397 and 1,072 hectares, respectively (Punjab State Archives, 1897, p.4). One thousand villages of the Hoshiarpur district and seventy villages of the Jalandhar district were affected by the devastation. This justified a reduction in the land revenue rate leading to a fall in revenue (Punjab State Archives, 1897, p.10).

The deforestation also had an adverse effect on water table in the Bist doab. Many wells were reported to have dried up in Hoshiarpur and Jalandhar districts. In one village alone, twenty wells were reported to have gone out of use (Glover, 1944, p.21).

All this impinged upon agricultural yields. Some farmers, especially in the foothill zone, began rearing sheep and goats. This in turn caused greater harm and did not allow the rejuvenation of forest or grass. A cycle of destruction had set in.
Wildlife

Another impact of the colonial rule was seen in terms of the loss of wildlife. The main cause for the extinction of lions and tigers from Punjab was the hunting of these animals with firearms. The hunting was indulged in extensively by the princes and British officers. The latter also contributed to the destruction of the wildlife by giving rewards for the killing of snakes and other dangerous animals. Leopards and wolves were frequently killed. The cheetah disappeared from north India round about 1920. The main cause for this was the decline in the population of its prey animals (Parshad, 1984, p.32).

Thus, the ecological damage during the colonial period could be associated with deforestation and canal construction. Deforestation for commercial wood was more typical of the Siwalik hills. Extensive soil erosion followed when the loose material was carried by the choes from the hills to the plains. This played havoc with the fertility of the land. Meanwhile, canal irrigation, geared to raise agricultural productivity, was not without its harmful effect of waterlogging at several places.

The Post-Colonial Period

Punjab was partitioned at the time of India's independence in 1947. An immediate task was to rehabilitate displaced persons from Pakistan. The Hindus and Sikhs had left behind 1,592,487 hectares of land in Pakistan while the corresponding
area left by the Muslims was only 991,010 hectares in the Indian Punjab. The Pakistani Punjab partook 62 per cent of the area, 55 per cent of the population, and 70 per cent of the canal irrigated land. The Indian Punjab inherited the agriculturally less productive and food-deficit part of the old Punjab (Randhawa, 1986, p.iv). There was a very wide gap of quality and quantity between the land that was lost and that which was available. To give a reasonable compensation to the displaced immigrants, cultivable land had to be extended. This could be done only by clearing any forest pockets or reclaiming marginal lands.

This was done. Even sand dunes were levelled to extend cultivation in the dry parts of the state. This took place in that part of Punjab which constituted the Patiala and other princely states before Independence in 1947. The extensive game sanctuaries of the former princes were also reclaimed for agriculture. This caused some loss of wildlife. Blackbucks, which were to be seen in their thousands near Patiala, gradually vanished (Stracey, 1963).

Consolidation of landholdings was a major land reform implemented soon after Independence. Several trees were cut and sold when the farmers came to know that their land may change hands. There was a considerable loss of trees on that count.

Positive gains of land consolidation were many. Among other things, it stimulated tubewell irrigation. This mode of
Irrigation was a pivotal factor in promoting the Green Revolution wherever canal water was not available. Tubewell sites were often given some tree plantation.

Efforts were also made to intensify agriculture through multiple-cropping. This was possible only through irrigation. After partition, Punjab was left with two canal systems - the Upper Bari Doab and the Sirhind Canal. Steps were taken to increase their discharge. More significantly, the Bhakra Canal System was laid during 1948-63. It had three components: (i) construction of a new Bhakra Canal, (ii) augmenting the capacity of the old Sirhind Canal and (iii) laying out of the Bist Doab Canal.

By 1966, Punjab had 52.9 per cent of its net area sown under irrigation. It ranked first in India; the Indian average being 19.5 per cent. Of the net irrigated area at that time, 57.8 per cent was served by canals, 39.5 per cent by wells/tubewells and the remaining 2.7 per cent by other means, such as traditional persian wells, ponds and rivers.

The extension of the canal network resulted in serious waterlogging conditions in Punjab during the fifties. About 1.6 million hectares had a water table within 1.5 metres from the surface. Anti-waterlogging measures were adopted by way of laying out a network of drainage channels. This reduced the waterlogging menace to some extent. Saline soils were also reclaimed in some areas.
Thus, the 1947-1966 period was momentous in the ecological history of Punjab. Landholdings had been consolidated and cultivated land extended. A remarkable increase in irrigation, by both canals and tubewells, laid the foundation of the ensuing Green Revolution which was based on the inputs of irrigation, chemical fertilizers and high-yielding variety of seeds. In the process, there was a loss of tree cover and wildlife.

Conclusion

The ecological history of Punjab lends itself to a tripartite periodisation: pre-colonial, colonial and post-colonial. During the pre-colonial period, technology was at a low level, and the damage to ecology was minimal, imperceptible and spread over centuries. Any ecological deterioration was associated mainly with three factors of desiccation due to disruptions in hydrological regimes; clearance of forests for extension of cultivable land; and political instability impelling people to take refuge in forests, thereby disturbing the fragile environmental balance.

Ironically, political stability and peace during the colonial period proved a greater threat to ecology. There was a considerable input of development in the form of new canals, agricultural colonisation, railways, some industry and construction in general. Its greatest impact was seen on forests. These were cleared to extend the frontiers of cultivation and were cut to supply wood for a variety of purposes. Deforestation
tion led to extensive soil erosion. Meanwhile, canal irrigation caused waterlogging in several parts of Punjab.

The initial phase of the post-colonial era also began with heavy demands on ecology. Two problems sought immediate resolution: reclamation of any suitable land for agriculture to rehabilitate displaced persons from Pakistan and conversion of the deficit in food production into surplus. Towards these goals, new lands were opened up and canal systems built. Problems of waterlogging and salinity followed. Likewise, consolidation of landholdings was a commendable reform but it also prompted cutting of trees standing in the fields. Agricultural developments during the first two decades after Independence, of course, laid the foundation of the forthcoming Green Revolution.