Chapter IV

4. A Impact of Urbanisation:

Introduction:

The driving force behind urbanisation in the Darjiling area was essentially the majestic natural beauty of the hills and the surroundings at the beginning but tourism could not take off immediately due to poor communication facilities. Without the balance of Investment and return, the growth of a place, area or region is not possible. From the beginning of the history of tea plantations the investors looked at short term gains in this industry. Clearing of forests for tea plantation and later for housing labourers destroyed the natural vegetation to a great extent. While population density shot up, unplanned settlement of habitats and urbanisation caused destruction of more virgin forestlands by means of deforestation. With the growth of the tea industry, communication and other infrastructural facilities improved and naturally some nature loving wealthy people started taking short visits as tourists. In course of time, travel and accommodation costs became cheaper and with GDP (Gross Domestic Product) improving, middle-income group people could visit this place recognised as a tourists spot. With limited land area, tourists visits and stay created stress on the existing resources. Thus a balance between demand and supply in the region is fast getting lost and thus review and analysis of the impact of urbanisation due to the tea and tourism industries is necessary to formulate appropriate planning to overcome the uncertain future of this place.

Part A: Deforestation:

4. A.1 Urbanisation and Deforestation in Darjiling District:

The natural vegetation of the Darjiling hill area is bestowed with splendour, magnificence and economically valuable forest wealth. Vegetation plays a key role in maintaining the ecological balance and sustenance of the society.
and Himalayan flora have unique similarities and whereas the western world has carefully maintained many of the species in our country they are either extinct or in the process of extinction. This is due to personal greed and excessive demand which has made us consider the forests as a useful commodity (only timber and firewood resource). Furthermore land grabbing for cultivation and or habitation has caused a setback through clearing of forests, loss of valued flora, aesthetics and finally imbalance in the ecosystem.

The Darjiling hill area is endowed with diversity, distinctiveness and desirable flora, many of which are endangered species. Apart from loss of large cover of greeneries (Satellite Imagery data) the slopes and hilltops look barren these days, implying a serious effect on the natural harmony of the environment. Land grabbing for cultivation and settlement has gone to such extent that conservation and management of forests have given way to lust for rapid money earning in the name of development.

When the hilly track of the Darjiling area was taken over from the Raja of Sikkim in 1835 by the Britishers, the green scenario and soothing climate with nearly 99% forest cover inspired them to establish a health resort. Within a span of ten years from 1839, a road from Pankhabari, a bungalow each at Pankhabari and Mahaldrum, a hotel in Darjiling along with 300 private houses, a bazaar, hospital, jail and sanatorium were built and population shot up from near 100 to over 10,000 in 1849. Again between 1861-1866, the Darjiling Cart Road was built. These constructions took away plenty of virgin forest land even before the tea and other cultivations. Subsequent to this, tea plantation garden owners sought to denude forests so that British rulers were compelled to establish the Forest Department as the custodian for conservation and management of forests. Its work was confined to the forestlands above 6000 ft in the hills and below 3000 ft in Terai. Already the virgin forests between 3000ft and 6000ft had dwindled and the hills took on an altered appearance. Afforestation measures were not known and lands abandoned after shifting cultivation retarded forest growth. The British Raj realised the impact of reckless exploitation of natural resources and in 1864 the Forest Department was created with Dr. Anderson appointed as the Conservator of Forests in Bengal to exert control on the felling of trees and forest clearing.
Chapter IV- Impact of Urbanisation

4. A.1.a Forest Administration (British period):

Over exploitation of forest wealth along with the soaring prices of timber compelled the British Government to introduce a reservation policy in 1865 like in other provinces of India. The forest products of both Darjiling and Terai area were reserved for sale under the wasteland rule of 1871-1872. Till 1874 the forests of Darjiling district had been included in Cooch Behar forest division and later in 1875 the Darjiling forests were made into a separate division. The Indian Forest Act VII of 1878 superceded the earlier Act which helped to increase the forest area of Darjiling to 412 sq km from approx 350 sq km. In 1879, the entire forest area of higher reaches was declared a reserved forest and only a small remainder of the subdivision was reserved for native cultivation. Soil conservation vis-à-vis harnessing landslides it became essential to protect the forests along ridges, hilltops and steep slopes of the mountains. Since coordination between the administration and surveillance were not in tune, timber poaching continued though the Government laid down legislation to prevent it. This resulted in the removal of all the best trees leaving hollow and defective trees, which should be removed on silvicultural grounds, to accumulate in the forest. Hence the Government did not allow anybody, except the direct agency of the forest Department, to fell any tree, under whatever grounds.

The first working plan scheme was evoked allowing selective felling of trees above 7500' elevation and partial clearing below (Brandis 1879 and Schllsh, 1880). As a consequence, the stock of Sal and other commercially viable trees were fast getting depleted. Mason (1892-1902) prescribed regeneration after felling which marked the beginning of afforestation measures. However artificial regeneration at the beginning did not meet the desired degree of success due to invasion by inferior species namely shrubs and weeds. It was a consequence of neglect of regular clearing for successive years after planting. Under Osmaston’s (1902-1912) working plans, the shelter wood was removed in final felling but no new regeneration was undertaken. Grieve’s Working plan (1912-1917) of group felling with a 25 years felling cycle of 150 years rotation did not produce desired results on regeneration. The system underwent gradual changes from selection felling by
Chapter IV- Impact of Urbanisation

group to regeneration felling by group method and ultimately regeneration became inevitable. Bakers Working Plan (1912 to 1928) was based on the realization that (a) natural regeneration is too slow, uncertain and insufficient in quantity after exploitation (b) A elevation below 7000 ft, where forest are never dense felling followed by planting should be practised, and in the area of field crop cultivation no danger exists for artificial regeneration. Chowdhury’s Working Plan (1929-30 to 1936-37) suggested continuation of clear felling and artificial regeneration system in all the accessible areas except in the Tista and Rangit valley forests. Mc Calpines plan from 1940-41 continued for twenty years, which was a slight modification of Chowdhury’s broad outline. The essential features of his plan were the provision of clear felling followed by artificial regeneration in accessible areas.

The first regeneration plantation in 1868 consisted of Oak, Chestnut, Walnut and Magnolia, which suffered very much from cattle damage and could not be identified as it got interlaced with later plantation. From 1892 – 1912 the plantation in the hills could not make much headway until Mason’s plan solved the problem by effecting regeneration felling to the extent of one half of the total crop keeping the other half as shelter wood. From 1929 – 1950 clear felling in strips along the contour were universally adopted. Plantations of usual hill species like Dhupl, Champ, Piple, Kawla, Buk, Phalant, Kapasi and Saur were raised during this period. The growth of Dhupl plantations was found to be successful wherever it was tried. Cryptomeria Japonica (Dhupl) which was imported for tea box planting was unsuitable for the purpose and thus was used for regeneration planting all along the hill slopes of Darjiling. But the quality was found to be inferior due to its faster rate of growth in India than that in Japan. However the controversy on the value of Cryptomeria culminated with the visit of Sir Gerald Trevor, Inspector General of Forest in 1934 who suggested research into the method and reducing this rate of growth by closer planting. Teak plantation in Badamtam area showed moderate success in growth. Forest Management during the British Raj underwent a slow and gradual change and acted as a pedestal for post-Independence administration of forest resource.
Chapter IV- Impact of Urbanisation

4. A.1.b Forest Management (Post Independence):

The Primary objectives of forest management were aimed at maximum revenue earning during the post Independence period. Therefore drastic changes like abolition of selective felling, clearing of forests at higher altitude above 6000 ft and replacement of native species of hardwood variety (like Sal, Teak etc) by fast growing soft wood variety (Eucalyptus) were introduced specially during the seventies. High priority of replantation programme of the British Raj was much neglected during the period and eventually a wide gap surfaced between felling and actual replantation. The adverse ecological effects, of Eucalyptus plantation like high rate of ground water depletion and lowering of soil pH was revealed within a decade and evidently undergrowth of these plantations turned barren. The need for appropriate plantation is not only for moisture, air purification and aesthetics apart from value based commercial exploitation, it plays an enormous role in the area of soil conservation and landslide control. It inhibits soil erosion by means of reducing the momentum of rainwater and surface flow. Groundwater recharge is also a contribution of forest growth apart from enriching the fertility of soil through production of humus. According to Environmentalists and Meteorologists, forest cover controls annual precipitation (rainfall) in a balanced way and ambient temperature round the year. Deforestation in the study area exemplifies the above observations through manifold increase of landslides, droughts and retarded growth of diversity of flora in recent years. Illegal and unplanned felling of trees on a mass scale destroyed more forest cover than extension of arable land for tea plantations as is evident from records and imageries. Demographic change with high rate of population growth compelled habitation to grab more land and even on hill slopes through terrace cultivation. Irrigation on terraces through diverting streams and opening canals sometimes created disastrous effect particularly during the late monsoon period.

Poverty, corruption and deforestation are interwoven in the hill region and only a small portion of money from total timber value reaches the poor labourers and the timber smugglers and unscrupulous beneficiaries extract major benefits.
In fact population increase renders unemployment, which in turn compels the poor people to work for timber poachers. A study made on collection of firewood by poor villagers for both domestic use and selling never proved to be a serious setback to the environment. However large quantities of firewood coming from forest cover are mostly used by poor, rural population and tea garden labourers for cooking and heating during the winter months. An integrated forest management programme to promote conservation, eco-promotion and appropriate scientific plantation is to be taken to provide a respite from the present crisis.

4. A.2 Change in forest cover in the study area:

Development of tea gardens in and around Darjiling town was at the expense of destruction of forest cover which is still continuing. Settlement and domestic encroachment are also taking place at the expense of forest land. In the British period, the rule permitted each garden to keep 40% of the total grant area as forest which was to be maintained by the planter. Each tea garden had its own forest areas attached to the estates. Besides this, the Government had some forest area under its direct supervision designated as "reserved forest". Apart from individual garden forests, in Darjiling P.S, there were three blocks constituting reserved forest in 1940. They are Sum (75.68 hectares) Patliabas (17.81 hectares) and Rangit (282.07 hectares). So in 1940 out of a total area of 104.6 sq km of Darjiling P.S, only 3.754 sq km (8.59%) remained as reserved forest (records of Revenue Department, 1955, Fig 3.8). The Rangit R.F (Fig 4.1 & 4.2a) located in the north eastern part of the study area, comprises mainly of Sal-Chir-Pine forest and dense mixed Jungle of Sal. Afforestation in this forest area has been carried out mainly in the late sixties and seventies by quick growing varieties of Sal. Till date, this forest area has the most dense cover of natural vegetation in the whole of Darjiling P.S. The Patilabas R.F (Fig 4.1 & 4.2b) and the Sum R.F (Fig 4.1 & 4.2 c) are both situated in the central part of the study area. The predominant variety here was middle and upper hill miscellaneous forest with extension of forest areas through afforestation programmes (mainly Sal). The plantations in the Sum R.F...
FOREST AREAS OF DARJILING P.S. (2000)

DENSE MIXED JUNGLE.
PREDOMINANTLY SAL
SAL-CHIR PINE FOREST
MIDDLE OR UPPER HILL
MISC FOREST
PLANTATION
LAND SLIDE AREAS
RIVERS
ROADS
SAND BARS

INDEX

SOURCE: DIRECTORATE OF FOREST, DARJILING

Fig 4.2
took place mainly in the seventies while in case of Patliabas it was the early twentieth century. The two reserved forest areas at present show only open jungle cover. Disparity in records is wide in case of reserved forest (under Government control). Table 4.1 enumerates the disparity in detail. Revenue records pointed out that in 1955 the total area under reserve forest were 3.754 sq km (8.59%) while on the other hand the census record 1951 shows that the reserve forest area (i.e. Rangit forest) covered 6.97 sq km which is 6.66% of the total area. In 1971 however suddenly the reserve forest areas decreased to 2.82 sq km while it again increased to 7.47 sq km (7.14%) in 1981 and remains the same till date according to Government records in 2000. This anomaly could not be explained. Mass afforestation had taken place mainly in the seventies (Fig 4.2) which may have been the cause for increase in forest areas. With the increase of population, there was a desperate attempt to acquire as much land as possible and gradually, the forest cover was encroached upon.

Table 4.1 Reserve Forest areas of Darjiling P.S

<table>
<thead>
<tr>
<th>Year</th>
<th>Rangit forest (in sq km)</th>
<th>Sum Forest (in sq km)</th>
<th>Patliabas Forest (in sq km)</th>
<th>Total Reserve Forest areas (in sq km)</th>
<th>% of forest area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>2.82</td>
<td>0.76</td>
<td>0.18</td>
<td>3.76</td>
<td>8.59</td>
</tr>
<tr>
<td>1951-1971</td>
<td>6.97</td>
<td>--</td>
<td>--</td>
<td>6.97</td>
<td>6.66</td>
</tr>
<tr>
<td>1971</td>
<td>2.82</td>
<td>--</td>
<td>--</td>
<td>2.82</td>
<td>2.70</td>
</tr>
<tr>
<td>1981-2001</td>
<td>2.82</td>
<td>1.68</td>
<td>2.97</td>
<td>7.47</td>
<td>7.14</td>
</tr>
</tbody>
</table>

Source: Census Records 1951-2001

During the British period, the forests on the upper part of the hills were spared from commercial usage, because there was concern about the risks of ecological disaster if these forests were to be denuded. After Independence, the demand for agricultural land, timber and firewood for cooking with increasing population resulted in reckless cutting of the forests, and even the upper layer of the forests was not spared. After mass afforestation programmes have been implemented, still a big gap remains between felling and replanting. The actual forest area calculated from topographical sheet No 78A/4 and 78A/8 of 1929-
Fig 4.3 CHANGING FOREST COVER - DARJILING P.S (1930 - 1962)

FOREST COVER 1930

INDEX

- DENSE MIXED FOREST
- OPEN MIXED FOREST/JUNGLE

GRAPH SHOWING PERCENTAGE OF FOREST AREA 1930

FOREST COVER 1962

INDEX

GRAPH SHOWING PERCENTAGE OF FOREST AREA 1962

SOURCE: Sol Sheet no. 78A/4 & 78A/8 1929-30

SOURCE: Sol Sheet no. 78A/4 & 78A/8 1962
FOREST MAP OF DARJILING P.S (2002)

MAXIMUM LIKELIHOOD CLASSIFICATION OF IRS-1D LISS III DATA

CHANGING FOREST COVER IN TEA ESTATES OF DARJILING P.S.

INDEX

FOREST MAP OF DARJILING P.S (2002)
MAXIMUM LIKELIHOOD CLASSIFICATION OF IRS-1D LISS III DATA

CHANGING FOREST COVER IN TEA ESTATES OF DARJILING P.S.
1930 reveals that in 1930 (Fig 4.3a) total forest area (including tea gardens) was 42% (dense forest) while in 1962 it decreased to 31% (Fig 4.3b). At present, survey done in tea gardens together with supervised classification of LISS 3 image shows two distinct forest classes. Dense forest areas are mainly confined to the northern and north-eastern part of the study area which is only 13% and open forest areas cover about 17% of the study area (Fig 4.4a). It is interesting to note that at present, no dense forest exists in the area of Sum and Patlabas (only patches of open forest exist) although officially the records still mention these as dense forest (Census and Forest Directorate Records, 2001).

The causes of depletion of forest areas in the tea gardens are somewhat different. After Independence, the percentage of forestland left with tea gardens remained quite substantial and well guarded by the planter. But the State Government after Independence issued an ordinance, and took total control of forest lands under its fold from the gardeners although no infrastructure towards maintenance and vigilance was created. Soon after, the forest land was encroached upon and destroyed rapidly by unauthorised people for illegal personal gratification. Afterwards, due to indiscriminate deforestation for fuel wood and domestic encroachment, the forest areas have shrunk to a large extent. From the mid-nineteenth century, the forests of Darjiling P.S have been exploited mainly to meet local demands. Tea estates consume large quantities of firewood as well as some timber for box planking. This is continuing even today as seventeen out of twenty gardens use timber packaging materials. Moreover, a majority of tea garden management in Darjiling P.S provide cash as fuel subsidy for the labourers. This indirectly helps in more forest destruction as the labourers keep the cash and cut the neighbouring forest that belongs to the Government for their household demand for fuel wood. Thus there is a vast difference between forest areas prior to Independence and afterwards (Table 4.2).

The tea gardens of the study area show a remarkable decrease in forest area in the last fifty years (Fig 4.4b, Table 4.2). The natural dense forest cover is depleted in most of the gardens of Darjiling P.S except in the tea gardens of Badamtam, Barnesbeg, Ging and North Tukvar. All the other tea gardens have open forest covered areas. This may be attributed to the growing population and
Increase in demand for fire wood and timber. Vast change in the forest cover may be noted in the gardens of Aloobari (31.6%), Pandam (25.46%), Soom (25.06%), Bannockburn (18.56%), Barnesbeg (18.35%), Rungneet (14.87%) and Phoobserling (11.29%).

Two gardens have been selected for case study a) Bannockburn and b) Phoobserling. These two tea estates have shown remarkable changes in forest cover and also in land use in the last sixty years. In Bannockburn Tea Estate (Fig 4.5), the tea area remains almost same with a slight increase (6%) whereas there has been an enormous change in forest area. In 1931 the dense forest areas covered 41% of the total area whereas in 2001 open forest covers 14% of the area and 20% has mixed land use. The mixed land use areas are agricultural land with patches of Jungle areas. The settlement area (settlement with agricultural land) shows a minor increase (1%). This also points out that though the settlement area has not increased, the population has increased three times creating more pressure on land. Landslides cover about 0.4% of tea area.

In Phoobserling tea estate, the changes are however different (Fig 4.6). The tea area has substantially increased (14%) though records show an inflated increase of 27% (Table 3.8). The forest areas in this garden also show considerable decrease from 53% to 34%. However in this garden, no dense forest cover remains and only open forests are present. The settlement area (with agricultural land) however shows an increase of 5%. The landslide areas cover about 0.5% of the tea area at present.
CHANGE IN FOREST COVER & LANDUSE
IN BANNOCKBURN TEA ESTATE (1931 - 2001)

Index
- DENSE MIXED FOREST
- OPEN MIXED JUNGLE/FOREST
- MIXED LANDUSE
- TEA GARDEN
- SETTLEMENT WITH AGRICULTURAL LAND
- LANDSLIDE

Fig 4.5
CHANGING FOREST COVER AND LANDUSE IN PHUBSERING TEA ESTATE OF DARJILING P.S. (1930-2001)

INDEX
- TEA GARDEN
- DENSE MIXED FORESTS
- OPEN MIXED FOREST/JUNGLE
- SETTLEMENT WITH AGRICULTURAL LAND
- LAND SLIDE AREA
- CONTOUR IN METRES.

Area under different landuse in Phubsering T.E (1930)
- Dense Mixed Forests: 52.45%
- Open Mixed Forest/Jungle: 35.25%
- Settlement with Agricultural Land: 10.66%
- Land Slide Area: 1.64%

Area under different landuse in Phubsering T.E (2001)
- Dense Mixed Forests: 48.56%
- Open Mixed Forest/Jungle: 34.71%
- Settlement with Agricultural Land: 16.18%

SOURCE PHUBSERING T.E

Fig 4.6
## Chapter IV- Impact of Urbanisation

### Table: 4.2 Change in forest cover in different tea gardens of Darjiling P.S. (1950 - 2001)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the gardens</th>
<th>Total area (1950) in hectares</th>
<th>Dense Mixed Forest (1950)</th>
<th>% of Forest</th>
<th>Total area (DPA records)</th>
<th>Open Mixed Forest area (2001)</th>
<th>% of Forest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aloobari</td>
<td>59.19</td>
<td>29.54</td>
<td>49.91</td>
<td>59.19</td>
<td>10.84</td>
<td>18.31</td>
</tr>
<tr>
<td>2</td>
<td>Arya</td>
<td>228.85</td>
<td>87.32</td>
<td>38.16</td>
<td>241.19</td>
<td>77.08</td>
<td>31.96</td>
</tr>
<tr>
<td>3</td>
<td>Badamtam</td>
<td>888.20</td>
<td>323.75</td>
<td>36.45</td>
<td>860.10</td>
<td>239.90*</td>
<td>27.26</td>
</tr>
<tr>
<td>4</td>
<td>Bannockburn</td>
<td>283.79</td>
<td>93.25</td>
<td>32.86</td>
<td>283.80</td>
<td>40.58</td>
<td>14.30</td>
</tr>
<tr>
<td>5</td>
<td>Barnesbeg</td>
<td>291.05</td>
<td>141.24</td>
<td>48.53</td>
<td>286.68</td>
<td>87.13*</td>
<td>30.18</td>
</tr>
<tr>
<td>6</td>
<td>Bloomfield</td>
<td>347.25</td>
<td>23.88</td>
<td>6.88</td>
<td>395.09</td>
<td>18.27</td>
<td>4.62</td>
</tr>
<tr>
<td>7</td>
<td>Ging</td>
<td>632.19</td>
<td>176.04</td>
<td>27.85</td>
<td>633.16</td>
<td>102.88</td>
<td>16.25</td>
</tr>
<tr>
<td>8</td>
<td>Happy Valley</td>
<td>173.68</td>
<td>38.86</td>
<td>22.20</td>
<td>174.00</td>
<td>20.71</td>
<td>11.90</td>
</tr>
<tr>
<td>9</td>
<td>Lebong &amp; Mineral Spring</td>
<td>819.73</td>
<td>271.95</td>
<td>33.18</td>
<td>821.92</td>
<td>Area resumed and garden closed</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Pandam</td>
<td>381.40</td>
<td>117.36</td>
<td>30.77</td>
<td>381.21</td>
<td>20.26</td>
<td>5.31</td>
</tr>
<tr>
<td>11</td>
<td>Pattabong</td>
<td>219.29</td>
<td>42.90</td>
<td>19.56</td>
<td>Included In Tukvar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Phoobsering</td>
<td>493.85</td>
<td>227.17</td>
<td>46.00</td>
<td>510.15</td>
<td>177.07</td>
<td>34.71</td>
</tr>
<tr>
<td>13</td>
<td>Risheehat</td>
<td>199.11</td>
<td>54.28</td>
<td>27.26</td>
<td>382.78</td>
<td>58.94</td>
<td>15.40</td>
</tr>
<tr>
<td>14</td>
<td>Rungneet</td>
<td>164.21</td>
<td>48.97</td>
<td>29.82</td>
<td>164.27</td>
<td>24.57</td>
<td>14.95</td>
</tr>
<tr>
<td>15</td>
<td>Singla(N. Tukvar)</td>
<td>512.32</td>
<td>155.40</td>
<td>30.33</td>
<td>561.98</td>
<td>147.72*</td>
<td>26.28</td>
</tr>
<tr>
<td>16</td>
<td>Singtom</td>
<td>579.31</td>
<td>164.35</td>
<td>28.37</td>
<td>609.78</td>
<td>98.68</td>
<td>16.18</td>
</tr>
<tr>
<td>17</td>
<td>Soom</td>
<td>607.69</td>
<td>303.51</td>
<td>49.94</td>
<td>507.00</td>
<td>126.16</td>
<td>24.88</td>
</tr>
<tr>
<td>18</td>
<td>Steinthal</td>
<td>34.41</td>
<td>11.33</td>
<td>32.93</td>
<td>Included In Singtom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Tukvar</td>
<td>617.51</td>
<td>80.94</td>
<td>13.11</td>
<td>672.03</td>
<td>69.24</td>
<td>10.30</td>
</tr>
<tr>
<td>20</td>
<td>Vah Tukvar</td>
<td>453.74</td>
<td>184.13</td>
<td>40.58</td>
<td>Garden closed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Forest Directorate and records of Individual tea gardens.

* Including Dense Mixed Forests.
Conclusion:-

From the foregoing discussion, it is quite evident that the study area has gone through indiscriminate deforestation in the last forty years for which natural forest cover has gone down from 31.74% to 13.21%. This is not desirable from the ecological balance in a biotic and abiotic environment. The National Forest Policy (1952) has demanded that at least 33% of the nation’s land area should be under forest cover to maintain ecological and climatic balance. Therefore, immediate remedial measures are necessary against the menacing effects of forest degradation. Immediate afforestation practices and control over destruction of forest areas through proper management programmes is imperative to maintain ecological and climatic balance.

4. B Part-B: Infrastructural Imbalances:

Introduction:

Darjiling town was planned to accommodate about 10,000 (1835) people with required amenities and infrastructural support. Over the years, the resident population has exceeded one lakh (2001) and the floating population is about twenty to thirty thousand daily (tourist season). This is encouraging local business but destroying civic facilities, its environment and culture. Water, air and aesthetics of the town are severely affected due to imbalance in requirement – availability – consumption – waste material disposal system.

4. B.1 Water Supply of Darjiling Town:

Since no stress has been given in our country on recycling, the water system of Darjiling town only involves tapping of source and supply and later waste water disposal through drainage. Neither ground water source nor rainwater harvesting has ever been considered in the region. The town has to depend on lakes (Senchal Lake, Balason catchment), rivers (Ranjit river - a major...
tributary of the Tista), springs and Jhoras for water supply. The distribution system consists of mainly piped stand posts and through tankers in the organized sector or directly from Jhoras through buckets in unorganized sectors.

4. B.1.a Previous System-

During the first half of the nineteenth century, water supply in Darjiling town depended on the Sengal and Sindhap lakes, which were fed by thirty natural springs. The water was pumped after filtering into two service reservoirs by 9" diameter pipes in the town from where the total distribution system was controlled. The reservoirs were built at St. Paul's School estate (capacity 1.14 thousand gallons) and Rockville (capacity 2.35 thousand gallons) from where the total area covered through pipes of various diameters and total length of supply was over 12½ miles. While the full-fledged Municipality started operating from 1910, the south lake on Sengal ridge had a capacity of 13 million gallons. Later in the Balason catchment area two more lakes Sengal North (1952) with a capacity of 20 million gallons and the Sindhap Lake (1978) with a capacity of 15 million gallons started operating (Plate No 4.1). However Sindhap Lake has failed to store and supply the estimated quantity of water due to some technical problems. It is said that the waterworks have been supplying good portable water with a high standard of purity. Local people mostly boil the municipal water before drinking as a mark of non-reliability on the quality of the water. During the dry season (October to March) when the yield of springs runs low, supply is augmented by pumping water from a perennial spring at King Khoia which is down below the hills.

The existing water supply system of 1910-15 had to be added up through additional installations like Khong Khoia pumping station, Rambi water line, Bokshi jhora and Bangla Khoia later to cope with the rapid increase in population (Fig 4.7a). Unfortunately, drastic fall in the quantity of water at natural springs of the catchment area compelled the Government to declare this as a sanctuary in 1930. Various anthropogenic factors are thought to be the major cause of such a crisis. Deforestation, uncontrolled population growth and a tendency towards
INDEX (SEWER SYSTEM)

I  Bazar Septic Tank
- 1 Chowk Bazar
- 2 Ladenla Road
- 3 Rockville
- 4 Gandhi Road
- 5 Jalapahar Road
- 6 Dr. Zakir H. Busti.

II  Wilson Septic Tank
- 1 Haridas Hatta
- 2 Kutchery
- 3 Hooker Road
- 4 Loreto Convent
- 5 Meadow Bank
- 6 Chowrasta
- 7 Hospital
- 8 Bazar

III  Kagihora Septic Tank
- 1 Mahtab Ch. Road
- 2 A. J. C. Bose Road
- 3 Dr. Girl Road.

IV  Bhutia Busty Septic Tank
- 1 Bhutia Busty
- 2 Toongsoong

V  Tukver Septic Tank
- 1 St. Joseph’s School
- 2 Public Latrine

SOURCE: DARJILING MUNICIPALITY

Fig 4.7
rapid urbanisation have deteriorated the quality of life in Darjiling town. A survey reveals that with normal rainfall, the yield of the springs during the lean season was 30-35 thousand gallons per hour (1960), which is only 12-15 thousand gallons per hour now. The standard of rainfall of earlier years had to be lowered in recent times as quantity of annual precipitation has gone down far below and absence of forests in the catchment area is considered to be a major factor. The problem of the water supply in the town is primarily the direct result of the heavy fall in the yield of the spring vis-à-vis considerable rise in the population of the town. Instead of increasing the supply of water commensurate with the rise in population, the supply has actually gone down substantially due to heavy fall in the yield of the springs.

4. B.1.b Present System-

Presently the water supply of Darjiling town consists of tapping of twenty-six springs (during the monsoon season this is reduced to eight due to lack of storage facilities) from the catchment area of Senchal forest located about 15 kms away from the main town. Taking a cue from the above, the tables below (Table 4.3a, 4.3b) clearly indicate that during the phases between 1980-1993 and 2000-2004 there was a consistent fall in water supply in each phase from Senchal lake due to decreasing availability and storage at site. Apparently, between the two phases, there is no significant difference in the rate of decrease. The later phase situation wise shows a slight improvement compared to 1980-1993 since population at present has increased manifold.

Table 4.3.a Water supply from Senchal Lake during lean months

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>36000</td>
<td>32000</td>
<td>23000</td>
<td>24000</td>
<td>27000</td>
<td>28000</td>
<td>25000</td>
<td>27800</td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>26000</td>
<td>22000</td>
<td>22000</td>
<td>22000</td>
<td>18000</td>
<td>20000</td>
<td>18100</td>
<td>19930</td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>29000</td>
<td>23000</td>
<td>18000</td>
<td>18000</td>
<td>15000</td>
<td>14500</td>
<td>12500</td>
<td>13160</td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>14100</td>
<td>16500</td>
<td></td>
</tr>
</tbody>
</table>

Source (Lama, 1994 and Rumba, 1986) NA- Not Available
Table 4.3b Water supply from Senchal Lake during lean Months
(Figures in gallons/hr)

<table>
<thead>
<tr>
<th>Months</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>36000</td>
<td>37000</td>
<td>34000</td>
<td>33000</td>
<td>30000</td>
</tr>
<tr>
<td>February</td>
<td>32000</td>
<td>30000</td>
<td>29000</td>
<td>31000</td>
<td>25000</td>
</tr>
<tr>
<td>March</td>
<td>26000</td>
<td>32000</td>
<td>33000</td>
<td>31000</td>
<td>22000</td>
</tr>
<tr>
<td>April</td>
<td>22000</td>
<td>24000</td>
<td>22000</td>
<td>23000</td>
<td>17000</td>
</tr>
</tbody>
</table>

Source: (Darjiling Municipality, 2004)

According to UN standards, a supply of 20 gallons of water per day per head (Indian standard 30 gallons per day per head) is enough for a person but the present supply is 6 gallons (approx) per day per head in Darjiling town during the lean period. The estimated demand for water for about 1.20 lakh residents of
Darjiling town is as follows - (Table 4.4). Against a demand of 16,20,000 gallons per day the total available water is only 7,11,500 gallons per day (Table 4.5) 9,08,500 gallons per day (approx) is the shortfall during the lean season.

Table 4.4 Approximate water demand for the population of about 1.20 lakhs -

<table>
<thead>
<tr>
<th></th>
<th>Domestic water demand taking 10 gallons/day/person as against 30 gallons/day/person as per Indian Standard</th>
<th>12,00,000 gallons/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Industrial and commercial water demand (Hotels and Restaurants) @ 10% of Total Water Demand</td>
<td>1,20,000 gallons/day</td>
</tr>
<tr>
<td>3</td>
<td>Water Demand for public use @ 5% of water demand</td>
<td>60,000 gallons/day</td>
</tr>
<tr>
<td>4</td>
<td>Fire Demand (taking no extra provision)</td>
<td>2,40,000 gallons/day</td>
</tr>
<tr>
<td>5</td>
<td>Water required to compensate losses in leakages, thefts, wastes etc. @ 20% of total water demand</td>
<td>2,40,000 gallons/day</td>
</tr>
<tr>
<td></td>
<td>Total (in gallons/day)</td>
<td>16,20,000 gallons/day</td>
</tr>
</tbody>
</table>

Source (Darjiling Municipality, 2004)

Table 4.5 Approximate water available from different sources during the dry period -

<table>
<thead>
<tr>
<th></th>
<th>Water available through conduit 6000 gallons X 24 hours</th>
<th>1,44,000 gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Water available from Khong Khola Pumping Station 500 gallons X 12 hrs (average) and 3500X 4 hrs</td>
<td>60,000 gallons</td>
</tr>
<tr>
<td>3</td>
<td>Water available from Sindhap lake 20,000 gallons X 5 hrs (average)</td>
<td>1,00,000 gallons</td>
</tr>
<tr>
<td>4</td>
<td>Water available from Rambl line 6250 gallons X 24 hrs.</td>
<td>1,50,000 gallons</td>
</tr>
<tr>
<td>5</td>
<td>Total</td>
<td>4,68,000 gallons/day</td>
</tr>
<tr>
<td>6</td>
<td>Less drawn by Army at Aliobart Pumping Station and Lebong unit (-)</td>
<td>50,000 gallons/day</td>
</tr>
<tr>
<td>7</td>
<td>Less for leakages etc. @ 20%</td>
<td>93,600 gallons/day</td>
</tr>
<tr>
<td>8</td>
<td>Total water available after leakages</td>
<td>3,24,000 gallons/day</td>
</tr>
<tr>
<td>9</td>
<td>Water available at Bokhi Jhora</td>
<td>12,000 gallons/day</td>
</tr>
<tr>
<td>10</td>
<td>Approximate water available through other natural springs at various places like Laldhikih Jhora, Bhagyakul, Bhotay Dhara, Girl Dhara etc.</td>
<td>20,000 gallons/day</td>
</tr>
<tr>
<td>11</td>
<td>Water available for 1 day</td>
<td>3,56,000 gallons/day</td>
</tr>
</tbody>
</table>

Source (Darjiling Municipality, 2004)
During the monsoon and immediate post monsoon season, (June- November) Municipal supply exceeds requirement by far and even individuals may collect rainwater directly to meet their requirement partially if not substantially. But in recent times, rainfall is never evenly spread over the months and naturally an imbalance in storage and supply occurs. The table below (Table 4.6) gives only a rough estimate of storage and capacity, which frequently alters due to meteorological fluctuations.

Table 4.6 Approximate water available from the existing storage reservoirs during the lean period of the year-

<table>
<thead>
<tr>
<th>Storage</th>
<th>Capacity (gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North lake</td>
<td>20 M.G</td>
</tr>
<tr>
<td>South Lake</td>
<td>13 M.G</td>
</tr>
<tr>
<td>Sindhap Lake</td>
<td>7 M.G</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40 M.G or 4,00,00,000</strong></td>
</tr>
<tr>
<td>Less 20% for losses (-)</td>
<td>80,00,000</td>
</tr>
<tr>
<td>Water stored for 90 days</td>
<td>3,20,00,000</td>
</tr>
<tr>
<td>Water stored for 1 day</td>
<td>3,55,500</td>
</tr>
<tr>
<td>Total water availability will be</td>
<td>7,11,500 gallons/day</td>
</tr>
<tr>
<td>3,56,000 + 3,55,500</td>
<td></td>
</tr>
<tr>
<td>Demand for water in a day during lean period is</td>
<td><strong>16,20,000 gallons</strong></td>
</tr>
<tr>
<td>Supply of water in a day during lean period is</td>
<td><strong>7,11,500 gallons</strong></td>
</tr>
<tr>
<td>Deficit</td>
<td><strong>9,08,500 (approx) gallons/day</strong></td>
</tr>
</tbody>
</table>

Source: (Darjiling Municipality, 2004)

Wastage of supply water through leakage of operating valves in the distributing line and unequal supply to individuals together with illegal tapping, faulty connections and neglect of public stand posts which are mostly kept open round the clock have added to the problem of water crisis. Apart from hospitals, defence units and other important installations like the Governor's House etc where regular supply of water is maintained, rationing is strictly followed for general supply as given below (average from 1999-2004):
PLATE NO 4.1 - SENCHAL GROUP OF LAKES SUPPLYING DRINKING WATER TO DARJILING TOWN

PLATE NO 4.2 - A TYPICAL SCENE OF WATER CRISIS IN DARJILING TOWN
Chapter IV- Impact of Urbanisation

November - December - 2 days break in supply
January - February - 3 days break in supply
March - April - 4-5 days break in supply
May - June - 3-4 days break in supply
July - October - Regular supply

Source (Municipality Office, 2004)

During the month of February 2004, the Municipal supply went down to one in five days and even in certain places like Chandmari it was once in every eight days. In 2004, water storage in the south lake was only two feet and in the north lake only nine feet whereas in 2003, it was always above eight feet in both the lakes (Darjiling Municipality). Year wise supply of water in Darjiling town (Table 4.7) in days per year indicates that the worst years were 1999 and 2004, which are 170-176 days in a year respectively. 2000 scored the highest figure of 201 days per year, which means there were 164 dry days with no water supply in the town. Acute shortage of water has put tourism in jeopardy (as the lean season coincides with the tourist season in Darjiling) and the breaking out of serious water borne diseases is not unlikely (Plate No 4.2). The major hotels of Darjiling (providing 24 hrs water supply) normally buy water from tankers and this is a regular feature of the town in the tourists season. Thus the accommodation costs in these hotels are much higher. The tankers get their supply from Jhoras located downstream about 50-60 kms from the town.

Table 4.7 Year-wise supply of Water in Darjiling Town (1998-2004)

<table>
<thead>
<tr>
<th>Year</th>
<th>Water supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>198 days/year</td>
</tr>
<tr>
<td>1999</td>
<td>170 days/year</td>
</tr>
<tr>
<td>2000</td>
<td>201 days/year</td>
</tr>
<tr>
<td>2001</td>
<td>180 days/year</td>
</tr>
<tr>
<td>2002</td>
<td>192 days/year</td>
</tr>
<tr>
<td>2003</td>
<td>199 days/year</td>
</tr>
<tr>
<td>2004</td>
<td>176 days/year</td>
</tr>
</tbody>
</table>

Source (Municipal Office, Darjiling, 2004)
Chapter IV- Impact of Urbanisation

Certain measures on short and long-term basis may improve the quality of life in the town as enumerated below-

4. B.1.b Short Term Measures: -
1. Total stoppage of felling of trees at the Senchal catchment area.
2. Realignment and reinforcement of protective works of existing Rambl pipe line.
3. Massive afforestation drive at the Senchal catchment area with quick growing varieties of trees and plants.
4. Construction of large storage reservoirs at suitable places.
5. Exploration of all natural springs.
6. Stoppage In supply of potable water for other uses.

4. B.1.c Long Term Measures: -
1. Feasibility of pumping water from Rungdung, Rangeet river, Balasun river.
2. Preparation of Master plan for Water supply management like new schemes administration, revenue collection and maintenance.
3. Alternative feeder mains via Hill Cart Road.
4. Construction of large storage reservoirs at suitable places.
5. Exploration of all natural springs.
6. Stoppage In supply of portable water for other uses.

4. B.2 Solid Waste Disposal/Management (SWM):

Solid wastes, generated from living bodies are more threatening to the environment due to immediate health hazards than processed (plastic etc) and earthy (soil) waste. Out of the total waste generated in a semi-urban area, nearly 1.4 % is inorganic and the rest is organic in origin. Post consumer waste generated by households, agro-Industries, construction work hospital and animal husbandry is endangering urban life since no action for recycling and incineration of the waste is taken by the appropriate authority. The hilly slopes of Darjiling township are unsuitable for landfill or dumping of garbage in or around the vicinity. Collection, disposal and ultimate management of liquid and solid waste, control the standard of living, namely, health and hygiene.
Presently, uncontrolled dumping of waste on the outer slopes of Darjiling town has come to a near impossible reclamation stage and is affecting the terrain below and inviting ecological disaster. In Darjiling town, about 50 metric tonnes of solid waste are generated everyday of which slightly over 60% is collected and properly disposed off (Municipal Report). Therefore uncollected waste in the town remains around 20 metric tonnes a day (Plate No 4.3). The management is trying to keep the city clean and impose awareness and discipline among the people through a few punitive actions. It is difficult to keep pace with rapid urbanisation and growing population of the area unless primary collection system and rapid disposal mechanism are improved. Presently Darjiling town has an insufficient primary collection system by way of bins and disposal through the vehicles of the Health and Sanitation Department of the Municipality, and finally dumping in the area above the Hindu Burial Ground (Plate No 4.4). Had there been an incineration system in the place like a cremation ground, a huge stress on the environment could be minimised. Through public conservancy, the major streets of the town totalling about 662 metres in length are swept manually everyday and apparently look cleaner during the early hours of the daytime.

Old Darjiling used ropeways for solid-waste disposal, which operated from "Butcher Busty" and this was undoubtedly a better scientific system. Later, in 1970, the local population objected and forcefully stopped the operation at the ropeway station that was never operative again afterwards.

A disposal site is located in the area above the Hindu burial ground. It is totally lacking in its own management techniques and presents an annoying look. The Municipal Authority feels that without direct government support, the problem cannot be handled since the department is understaffed (i.e. one sweeper per every 1000 population).

It is logical that the hill area of prime tourist location should have a special method of sanitation, cleanliness and solid waste management. Table 4.8 briefly illustrates the management scenario of the hill town.
Table 4.8: Important Features of Solid Waste Management in Darjiling Town

<table>
<thead>
<tr>
<th>Management scenario</th>
<th>Other Important Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total waste generated/day</td>
<td>Per capita waste generated (gms/day)</td>
</tr>
<tr>
<td>(tons)</td>
<td>50</td>
</tr>
<tr>
<td>Waste collected at sites</td>
<td>Collection performance in %</td>
</tr>
<tr>
<td>130</td>
<td>62</td>
</tr>
<tr>
<td>No. Of vehicles</td>
<td>Vehicle capacity to % of waste generated</td>
</tr>
<tr>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>No. Of labourers</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
</tr>
<tr>
<td>No. Of disposal sites</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Bin population ratio</td>
<td></td>
</tr>
<tr>
<td>1:860 persons</td>
<td></td>
</tr>
</tbody>
</table>

Source: (Municipal Office, Darjiling, 2004)

The shortcomings and deficiencies as felt in solid waste management system by the Municipal authorities are:

- Paucity of Fund
- Lack of technical know-how
- Lack of peoples' participation
- Lackadaisical work culture
- Inadequacy in storage system and area
- Inefficient transportation system of waste
- Lack of synchronisation between collection and transport
- Inappropriate processing and disposal of waste.

The Municipal council with maximum effort can collect waste from the households but is able to cover only 30%. The remaining 70% is disposed on open streets. There are 130 waste storage depots out of which 76 are central vats and the ratio between bin and population is 1:866. Therefore waste collection points (dustbins) remain filthy and spill all over and compel the users to throw waste from a distance making the situation worse. Since there is no accountability of the inhabitants towards environmental protection, they dispose of the waste down the hills or into the 'nalis' in an irresponsible manner. Solid waste on the roadside...
Chapter IV- Impact of Urbanisation

and in the nalas creates an uphill task for cleaning and draining. Even use of plastic carry bags has been totally forbidden in the hill area since January 2004.

No system for isolating reusable or recyclable waste from the rest is in vogue. A lot of organic biodegradable waste, which could have been wealth for increasing the fertility of the soil, is lost. Vehicles for transportation of wastes are inadequate, old and few in number so that only a fraction of the total waste from the town could be carried to the ultimate disposable site. Labour forces for loading and unloading of the waste and regular cleaning services are far below the required number and therefore disposal of wastes are far behind the schedule and creating an unhygienic environment in many places of the town.

Surveillance and monitoring of waste disposal with appropriate technology could have arrested a lot of environmental pollution, sub-soil contamination and health hazard of the community. Technology transfer and implementation of waste disposal system as practised in an urban area of developed countries should be seriously taken into consideration if abatement of risk and hazards of urban living is desired.

4. B.2.a Solid Waste Management and Recommendations

Following three key pieces of advice namely (1) check at source (2) produce minimum (3) recycle; recommendations for the existing system of solid waste management is rather easy but implementing them is an uphill task. The service provider i.e. Municipal Corporation is itself suffering from lack of fund, value based efforts and administrative lacunae and therefore the quality of life which the Government is bound to offer falls, even in a small hill town. The WHO (World Health Organisation) has identified twenty-two virulent diseases caused through improper SWM practices. Cleanliness is an individual practice but regulatory bindings and continued awareness programmes through formal and informal education are the responsibility of the government. With the advent of many NGO, the government finds that their responsibility is greatly reduced. However generalised recommendations are enumerated herewith.
Chapter IV- Impact of Urbanisation

- Storage of waste at source - A common practice of the western world where solid waste are always put in slit containers and disposed through public transport.
- To keep domestic hazardous waste separately with special identification.
- Hospital wastes (bio-medical wastes) from laboratories, nursing homes and other health care centres should strictly follow bio-medical waste rules 1998 and collection should be done more carefully.
- Construction and demolition waste should be stored separately and used as landfill for improved landscape design.
- Recyclable waste should be segregated separately and made use of for profitable purposes like compost and biomass generation (improve soil fertility).
- Transportation of waste should be regular and at fixed intervals.
- Processing and disposal of waste through standard practices should be adhered to, keeping in view arranging composting of all biodegradable materials following process of microbial composting of wastes.

Public awareness and regulatory bindings along with continued surveillance and monitoring of collection and disposal should be strictly followed. Through the participation of school and college students as part of their social work curriculum, a few clean surroundings should be developed which would motivate the residents to appreciate the quality of life and act accordingly.

4. B.3 Sewerage-Liquid Disposal System:

The sewerage system of Darjiling town was constructed more than 70 years ago and covers about 35% of the town and that too in the selected areas where Europeans initially settled. The town generates over 6.6 million litres of sewerage per day. The fact that tourist centres like Darjiling require a different method of sanitation and cleanliness particularly in view of the heavy influx of a floating population like tourists, students and daily wage earners from outside has put severe pressure on civic amenities. Over and above, an old and inadequate sewerage system for collection, treatment and disposal of liquid and semi-liquid
waste into the big septic tanks built to denature the waste do not function in an appropriate manner. Bazar septic tank, Wilson septic tank, Kakjhora septic tank, Bhutia Busty septic tank and Tukvar septic tank (Fig 4.7 b) of different capacity built to support users ranging from 300-13000 are far below the required service. Table 4.9 illustrates the sewerage and sanitation status of Darjiling town at a glance. It is apparent that only 58% of the present population is covered by safe disposal facility and only 38% of the total slum population is provided with community facility. The state of the art is highly deplorable.

Table: 4.9 Important features of Sewerage and Sanitation.

<table>
<thead>
<tr>
<th>Sewerage</th>
<th>Sanitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of sewerage MLD</td>
<td>No. of Septic Tanks 1300</td>
</tr>
<tr>
<td>Sewer length in kms</td>
<td>No. of Public Toilet 2003</td>
</tr>
<tr>
<td>Treatment capacity</td>
<td>Total holdings with sanitation facility 5803</td>
</tr>
<tr>
<td>No. of connection</td>
<td>Community Facilities (No.) 118</td>
</tr>
</tbody>
</table>

Source: Municipal Office, Darjiling - 2004

Within the Municipal limits many of the community latrines are not provided with even soak pits and the refuse is directly connected to open jhoras. The affluent class and standard group of hotels have their own individual septic tanks and the treated refuse is passed into the central sewerage system. As already mentioned the sewerage and sanitary system in Darjiling town is inadequate, inefficient and poor due to inappropriate capacity, rapid increase in population, poor maintenance and surveillance, explosion of exodus, poor availability of funds and over and above poor hygienic sense and habit of the common people.

To provide healthy sanitation within the Darjiling Municipality the following measures are suggested:

- Septic tanks either of community type or bigger dimension need to be installed at suitable places and accordingly main sewerage networks are to be laid.
Chapter IV- Impact of Urbanisation

- The places of concern are Bloomfield, Lhassa Villa, Nimkidhara Mary Villa, Rajbari, Rose Bank, Stryam Cottage, Toong-Soong Including Jawahar Busty, Bhanugram, North Point, Bhutia Busty, Hermitage, Holmden, Limbu Busty etc. within Ghoom-Jorebunglow surroundings need to be attended to through installation of effluent treatment plants (ETP), production of manure and if possible biogas plants.

- Provision for tapping all available jhoras/drainage ditches at higher level so as to facilitate sedimentation and screening of waste water and later injection into main sewerage lines is necessary for flushing and keeping the underground lines cleaner and clog free.

- Since such project will require a long time for implementation it should be divided into phases and priority should be given to densely populated areas.

4. B.4 Drains and Jhoras:

The hill tracts of Darjiling with complex topography have produced an intricate drainage system, which is quite different from that of the adjoining plains. The rate of scouring and erosion of terrains by rivulets (jhoras) and gullies and production of landslide prone horizons is an arduous scientific study to relate damage through time.

There are 7 major and 27 minor jhoras naturally created and about 65 km of roadside drain within the Municipal area, which carry waste materials down below the town by gravity action. Unfortunately due to insufficient water flow in the region, flushing is inadequate and therefore constant physical maintenance is necessary to keep a total health guard of the inhabitants.

Reluctance and casual attitude of the inhabitants while handling solid wastes (50 tonnes/day) have been causing enormous pollution problem in the area. Clogging of drains (Plate No 4.5) and impediments in the jhoras often spill dirty wastewaters into habitational areas amounting to serious health hazards.
4. B.5 Roads:

The serpentine and steeply sloping roads of about 90 kms in length covers the Municipal area except Hill Cart Road and Lebong Cart Road, the main arteries and approach of Darjiling P.S. Though 75% of the roads are metalled, they are not meant for heavy vehicles and lack of proper maintenance causing despair to better living. Table 4.10 shows various types of roads with respective lengths within Darjiling Municipal area which clearly entails that 45% roads are not motorable.

Table: 4.10 Showing total length and types of road in Darjiling Municipality

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Types of roads</th>
<th>No.</th>
<th>Length in kms.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Motorable Bituminous Road</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>2.</td>
<td>Non-motorable Bituminous Road</td>
<td>61</td>
<td>14.50</td>
</tr>
<tr>
<td>3.</td>
<td>Water bound Macadam Road</td>
<td>21</td>
<td>9.50</td>
</tr>
<tr>
<td>4.</td>
<td>Concrete stepped Path</td>
<td>25</td>
<td>2.50</td>
</tr>
<tr>
<td>5.</td>
<td>Kuccha Roads</td>
<td>10</td>
<td>13.50</td>
</tr>
</tbody>
</table>

Source: Municipal Office, Darjiling, 2004

Increase in vehicular movement by number and types create enormous stress on (Table- 4.11) existing roads apart from constraints like narrow width, invalid railway tracts, water mains and unauthorised roadside constructions in most of the areas, broadening of roads is not possible and diversions are inevitable. Traffic Jams (Plate No 4.6), and road accidents are frequent happenings and roadside conditions are essentially responsible for these. Improvement of the present situation needs huge financial support since construction cost in the area is more than five times than that in the plains.
PLATE NO 4.5 CLOGGED DRAINS BLOCKING FREE FLOW OF WATER DUE TO DUMPING OF WASTE MATERIALS IN DARJILING TOWN

PLATE NO 4.6 VEHICULAR CONGESTION IN DARJILING TOWN DURING TOURISTS' SEASON
Table 4.11 Showing number of Vehicles plying in Darjiling Municipal area

<table>
<thead>
<tr>
<th>Area</th>
<th>Number of Trucks</th>
<th>Number of Commercial Vehicles</th>
<th>Number of Private Vehicles (Including tea garden vehicles)</th>
<th>Number of Mini-bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darjiling Municipality</td>
<td>100</td>
<td>400</td>
<td>600</td>
<td>204*</td>
</tr>
</tbody>
</table>

Source: Transport Department, D.M Office Darjiling, 2004

* During tourist season (74 during off-season)

The Darjiling Municipality has offered the following suggestions to improve road conditions and traffic movement.

- All motor repairing garages should be moved out of the town and are to be housed in two complexes, one at Lebong and the other at Batasla site.
- A big bus terminus with truck unloading facilities and taxi stand be constructed at Batasla so that heavy vehicles can be prevented from entering the town.
- Fee car parking space in all-important locations be introduced and increased.
- Possibility of a new road from Jorebunglow and Ghoom area via Pandam T.E, joining Lebong may be explored.
- The existing Victoria Road be broadened and made motorable for small vehicles.
- Pedestrian movement be controlled by constructing pathways so that loitering crowd does not deter vehicular movements.

Motor Vehicles Department has also felt the severity of the problem and therefore envisages the imposition of certain restrictions on regular vehicular traffic. It includes restrictions on regular vehicular traffic, on parked vehicles in fixed numbers, one-way entry on important roads, stringent speed and halt restrictions and creation of more taxi stands and parking spaces.
Chapter IV– Impact of Urbanisation

Conclusion:

Darjiling Municipality in terms of the management of the most basic sectors like water supply, conservancy (sewerage, solid waste disposal) and roads etc is in a deplorable situation. Amenities and services like water supply, waste disposal, roads and communication, health support etc in the town which could support maximum twenty thousand people has now a resident population exceeding one lakh with a floating population of nearly twenty to thirty thousand daily (tourist season) today. It is needless to mention that Darjiling Municipality is in utter failure to offer a standard secure and comfortable living. Outbreak of serious infectious diseases is not unlikely due to the poor disposal system. Apart from unhygienic water quality, water supply in quantity is just one fifth of the standard requirement per head per day.

Unplanned and illegal civic construction has not only spoiled aesthetics and natural landscape designs but also seriously affected hill slope stability at many locations in and around Darjiling town and the frequency and magnitude of landslides has increased by leaps and bounds. Immediate steps should be taken to upgrade the conservancy system, water supply and communication.
Chapter IV- Impact of Urbanisation

References:

- Dasgupta, M (1986): Forest Management in Darjeeling Hills areas from British Raj to Swaraj- The Eastern Himalayas, Environment & Economy, Atma Ram & Sons, Delhi, pp 136-168
- Integrated Development Scheme of Darjiling Municipality (2002): Published by Chairman Darjiling Municipality.
Chapter IV- Impact of Urbanisation


Census Handbooks: