CHAPTER III

CHANGES IN LAND USE PATTERNS

Agricultural land use in the Bist Doab experienced considerable changes during 1951-80. The net area sown in the region increased from 58.1 per cent in 1951 to 67.6 per cent in 1966 and to 79.0 per cent in 1980. This positive change was largely brought through the extension of cultivation on culturable waste lands and fallow lands which decreased from 12.0 to 2.8 per cent and 10.8 to 0.9 per cent respectively during the same period. Faster growth of population and consequent increase in population pressure on land, expansion of irrigation to wider areas, mechanization of agriculture, enactment of land reforms in the form of land ceiling and provision of ownership rights to tenants etc. went a long way in extending cultivation on new as well as on fallow lands. In comparison to the region, net area sown in the state increased from 70.5 to 77.4 and to 83.1 per cent in 1951, 1966 and 1980 respectively. It clearly reveals that the region registered larger increase in net cultivation vis-a-vis the state. This is because, the Bist Doab had greater scope for the extension of cultivation than the state in 1951. Land not available for cultivation in the study area declined from 18.8 per cent in 1951 to 11.5 per cent in 1980. Notable decrease in this category is largely the result of damming and channelization of the major rivers and seasonal streams. As a result, a part of the land which was previously under their water channels was made available for cultivation. Soil conservation measures, particularly in the hills, too brought similar developments. Growing awareness about the need of forests for ecological balance and ever growing demand of wood
for fuel and construction brought increase in area under forests in the Bist Doab from a negligible proportion of 0.3 (2,770 hectares) to 5.9 per cent (52,824 hectares) of its total area during 1951-80.

The land of the Bist Doab like that of the state and the country as a whole is divided into five major classes, viz. (i) net area sown, (ii) fallow land, (iii) culturable waste land, (iv) land not available for cultivation, and (v) forests. In order to understand the changes in agricultural land use of the region more comprehensively, each land use category is being taken up for a comprehensive analysis.

**Net Area Sown**

Net area sown refers to that part of the cultivated land on which sowing is actually done at least once during a year. It does not include double cropped area and in itself constitutes the basic category of agricultural land use.

**Spatial pattern of change in net area sown during 1951-80**

As referred to earlier, the proportion of net area sown in the Bist Doab increased from 58.1 per cent (529,872 hectares) in 1951 to 67.6 per cent (620,981 hectares) in 1966 and to 79.0 per cent (710,256 hectares) in 1980 (Maps 3.1 to 3.3). The positive change of 20.9 per cent during 1951-80, however, is not uniform in all parts of the region. Out of a total of 35 assessment circles, 31 recorded increase ranging from 4 per cent in Sirowal circle of Garhshankar tahsil to 59.5 per cent in Bet circle of Balachaur tahsil. The remaining four assessment circles recorded marginal decrease
BIST DOAB

NET AREA SOWN
(Data by Assessment Circles)

1951

As percentage of total area

0 - 15 Kms

No of Units

20 15 10 5 0

As percentage of total area

50 70 90

MAP 3-1

1966

As percentage of total area

0 - 15 Kms

No of Units

27 15 10 5 0

As percentage of total area

50 70 90

MAP 3-2

1980

As percentage of total area

0 - 15 Kms

No of Units

15 10 5 0

As percentage of total area

50 70 90

MAP 3-3

Change 1951-80

Change in percentage

0 - 17 Kms

No of Units

15 10 5 0

Change in percentage

10 Increase

5 Decrease

MAP 3-4

Source: Unpublished Revenue Records (Lai Kitabs)
varying between 0.7 and 1.4 per cent. For a geographic analysis of changes in this land use category, the Bist Doab may be divided into the following four types of areas (Map 3.4):

1. **Areas where increase in net area sown is over 30 per cent**;

2. **Areas where increase in net area sown ranges between 15 and 30 per cent**;

3. **Areas where increase in net area sown is below 15 per cent**; and

4. **Areas where net area sown decreased**.

1. **Areas where increase in net area sown is over 30 per cent**

Flood plain of the Satluj in Balachaur, Nawanshahr and Nakodar tahsils and that of the Beas in Kapurthala and Sultanpur tahsils experienced an increase of over 30 per cent in net area sown. Besides, Dona assessment circles of the Kapurthala and Sultanpur tahsils, almost whole of Phagwara tahsil and Kandi as well as Rakkar circle of Dasuya tahsil too fall in this category. Increase in net area sown in all these assessment circles oscillates between 33.0 and 59.5 per cent.

Construction of Bhakhra Dam on the Satluj, Pong Dam on the Beas, and natural levees along these rivers rescued large areas from the menace of floods and waterlogging and were pressed under cultivation. The measure also enabled the extension of regular cultivation on fallow lands. Extension of cultivation on new lands in the flood plains was largely brought
by the farmers who in-migrated from the neighbouring overcrowded upland plain. However, an increase of high magnitude in net area sown in case of Dona circles of Kapurthala and Sultanpur tahsils is due to different reasons. These assessment circles are marked with sandy soils deposited by winds. The sub-soil water is also deep. Due to these counts irrigation in these units was limited in 1951. A considerable part of their land was either lying waste but was cultivable or was designated as fallow. But after the initiation of Five Year Plans, irrigation made considerable headway through the installation of tube-wells and pumping sets. It facilitated the extension of cultivation on cultivable waste lands and fallow lands, thereby resulting in substantial increase in cultivated area.

Phagwara tahsil too recorded high increase in net area sown. A sufficiently large amount of cultivable waste land and fallow land was present in this tahsil during early fifties, due mostly to waterlogging and soil erosion created by occasional flooding of the east Bein. Channelization and narrowing down its course and also the courses of some of its tributaries reduced waterlogging and soil erosion to a great extent thereby enabling the extension of regular cultivation on cultivable waste land and fallow land. Apart from this, the increase in irrigation helped pressing many idle lands under the plough.

It is apparent that whole of the Kapurthala district, which was formerly a part of the princely state, experienced high increase in proportion of net area sown. Here, the feudal rule prevailed even for a few years after Independence (1947). The ruler of the state used to lead a luxurious life and maintain vast stretches of land for hunting. Therefore, the proportion of cultivable waste land in areas falling in this district was high at the
beginning of the study period in 1951. It started declining fastly after the merger of the state into Punjab in 1956 and hence brought remarkable increase in net cultivation.

Kandi-Rakkar areas of Dasuya too had considerable potential lands for extension of cultivation which were brought under the plough due to the development of irrigation. Some of their fallow lands too were brought under regular cultivation.

2. **Areas where increase in net area sown varies between 15 and 30 per cent**

An increase ranging from 15 to 30 per cent in net cultivated area is a characteristic of Dona Lehnda and City Circle of Jalandhar tahsil, Dona and Manjki circles of Nakodar tahsil, Sirowal circle of Phagwara tahsil, Maira circle of Dasuya tahsil and Kandi circles of both the Garhshankar and Balachaur tahsils.

Leaving aside the City Circle of Jalandhar and the Kandi circles of Garhshankar and Balachaur tahsils, all other assessment circles falling in this category had relatively high base of cultivation in 1951. Proportion of net area sown in all these parts at that time varied between 68.1 and 71.9 per cent. Therefore, they offered a moderate scope for further extension of cultivation. Whatever increase recorded here was mostly through the development of irrigation. In City Circle of Jalandhar, moderate increase in net area sown is ascribed to the fact that a considerable proportion of its land was occupied by urban activities in 1951 which further encroached upon the good agricultural land. Thus a part of the increase in net area sown
through limiting of fallow land and culturable waste land was neutralized by the extension of urban land use.

Kandi assessment circles of Garhshankar and Balachaur tahsils constitute another area where increase in net area sown is moderate. These assessment circles had a very low proportion of net cultivation in 1951 and continued to lag behind with moderate increase in this respect. The base of cultivation in these units was low due to their rugged and chue-dissected topography. For the same reasons, the potential for extension of cultivation was also not very high. Whatever increase in net cultivation recorded, was mostly due to channelization of seasonal streams, adoption of soil conservation measures and improvement in farming techniques (including irrigation).

3. Areas where increase in net area sown is below 15 per cent

An increase of less than 15 per cent in net area sown is a feature of (i) the eastern half of the upland plain and (ii) the whole of the foothill and parts of hilly zone.

The eastern half of upland plain covering whole of Phillaur tahsil and most of Nawanshahr and Jalandhar tahsils witnessed low increase (6.9 to 12.7 per cent) in net cultivation. Actually this is the area which was put to intensive ploughing even during the early 1950's because of favourable topography, fertile soils and early development of irrigation (Map 3.1). Thus, the scope of further extension of cultivation was limited. The area associated with the foothill plain and parts of the hilly zone in Hoshiarpur tahsil is another tract where extension of net area sown was low. Already high base
of cultivation in this part of the foothill plain which resembles the upland
plain in this regard, and problem of soil erosion by seasonal streams in parts,
largely explain low increase in net area sown in this tract. But in case of
the hilly zone of Hoshiarpur tahsil, low increase is attributed to the limited
availability of potential lands, low development of irrigation and continued
dissection of land by the choes.

4. **Areas where net area sown decreased**

Contrary to the general trend, the net area sown decreased, though
marginally, in Bet assessment circle of Dasuya tahsil, Rakkar assessment
circles of both the Garhshankar and Balachaur tahsils and Retli assessment
circle of Nawanshahr tahsil. The decrease in Bet of Dasuya is ascribed to
the emergence of waterlogging, which rendered some cultivated land unfit
for the purpose. This problem was created by seepage from the river and
from the Shah Nahar canal system operating here since 1893. Increase in
soil erosion in Rakkar assessment circles of Garhshankar and Balachaur tahsils
brought similar results. Channelization of streams and soil conservation measures
could not make much headway in these areas. Decrease in net area sown
in Retli assessment circle of Nawanshahr tahsil is only marginal (0.8 per
cent). This unit had very high proportion of its area under net cultivation
in 1951, which slightly declined due to encroachment on agricultural land
by non-agricultural uses.

In short, excepting a few assessment circles, the whole of the
Bist Doab experienced a positive change in net area sown. Increase in population
pressure and consequent increase in demand for agricultural land, growing
commercialization in agriculture and development of irrigation mainly explain this fact. The expansion of agricultural resource base, however, was higher in the flood plains, where flood control measures; and in Dona tract where development of irrigation paved the way for faster expansion of cultivation on new as well as on fallow lands. Most of Phagwara tahsil and eastern parts of Dasuya tahsil too experienced considerable increase. In these parts, large areas were lying idle which furnished potential lands for extension of cultivation. Eradication of waterlogging from the affected pockets, checking of seasonal floods in the Bein and extension of irrigation brought higher increase in net area sown in Phagwara. Extension of irrigation brought similar results in parts of Dasuya tahsil. The eastern half of the upland plain and adjoining parts of the foothill plain, which were already under intensive cultivation in 1951; and most of the hilly and remaining parts of foothill tract, where physiography was adverse, recorded low increase in net cultivation.

Spatial Pattern in 1980

The Bist Doab had 79.0 per cent (710,256 hectares) of its area under net cultivation in 1980. This figure, though fairly high in comparison to the national average of 47 per cent yet it is lower than the state average of 83.1 per cent. Concentration of a greater proportion of hills, dissected areas and river/choe beds in the Bist Doab largely explain this fact. Net area sown in the study region, however, varies areally, ranging from as low as 19.4 per cent in Kandi assessment circle of Hoshiarpur tahsil to as high as 96.6 per cent in Manjki assessment circle of Phagwara tahsil. For analysing
spatial variations in the existing patterns of net area sown, the region may be divided into the following three types of areas (Map 3.3):

1. Areas where net area sown exceeds 90 per cent;
2. Areas where net area sown ranges between 70 and 90 per cent; and
3. Areas where net area sown is below 70 per cent.

1. **Areas where net area sown exceeds 90 per cent**

An elongated belt running in the north-south direction in western part of the region has very high (above 90 per cent) proportion of its area under net cultivation. The net area sown in this tract varies from 90 per cent in Sirowal circle of Dasuya tahsil to 96 per cent in Dona circle of Nakodar tahsil. It had fairly high percentage of its area under net cultivation in 1951 which was further extended to its near limits by bringing more and more culturable waste lands and fallow lands under the plough. The expansion of irrigation and adoption of better agronomic practices largely account for this positive development.

Besides the above stated tracts, a few isolated units, such as Retli assessment circle of Nawanshahr, Sirowal assessment circle of Balachaur and Manjki assessment circle of Phagwara tahsil also have more than 90 per cent of their area under net cultivation. The Retli and Sirowal assessment circles had high proportions of their area under this category in 1951 which increased further to exceed 90 per cent by 1980. But Manjki circle of Phagwara recorded very high increase during 1951-80, and thus attained a high level
in the percentage of net area sown. Development of irrigation in all these areas largely brought this change.

2. **Areas where net area sown varies between 70 and 90 per cent**

Most of the upland plain and foothill plain and parts of the flood plain have 70 to 90 per cent of their total area under net cultivation and therefore, fall in the medium category of agricultural resource base. Moderate proportion of net cultivation in case of upland plain is because, it is more overcrowded and more urbanized. A notable part of its area is under settlements, roads, railways, and other developmental activities. The foothill plain on the other hand is dissected by a number of seasonal streams. Soil erosion is rampant and soils in many parts of this plain are marginal. Thus, it does not have high proportion of net area sown. Some parts of the flood plain especially in Kapurthala, Sultanpur and Balachaur tahsils too fall in the same category, due largely to the fact that significant proportion of their land is lying under the river beds.

3. **Areas where net area sown is below 70 per cent**

Low (below 70 per cent) proportion of net area sown is a feature of the areas associated with Shiwalik hills, where soils are very poor, dissection is severe and irrigation is highly limited. A considerable part of the land is occupied by barren hills, choe beds and is severely eroded and thus is not available for cultivation. Flood plain of the Beas in Dasuya tahsil and that of the Satluj in Nawan-shahr tahsil also have low proportion of net area sown. Here, the problem of waterlogging is more pronounced, besides the fact that river beds also cover a part of
the land over which cultivation is not possible. The City Circle of Jalandhar tahsil is another area where too agricultural resource base is low. This is exclusively due to the fact that significant proportion of its land is under intensive urban uses.

The preceding discussion clearly reveals that the upland plain and adjoining parts of foothill plain have very high proportion of their area under net cultivation. Predominantly flat topography, fertile soils and fairly developed irrigation system largely explain this fact. Variations in net cultivation in these areas are small and are due to unequal use of land for non-agricultural purposes and presence of few larger seasonal streams. The hilly area where a considerable proportion of land is not available for cultivation due to physical constraints, has the lowest proportion of its area under net cultivation. The flood plains where river channels occupy a part of the land and waterlogging is still visible in some parts, fall in between the two types of areas discussed above in terms of agricultural resource base.

**Fallow Land**

Fallow land refers to that part of the cultivated area which is kept idle for a season or for a period extending upto four years. It is of two types (i) current fallow and (ii) fallow land other than current fallow. The current fallow is that part of the cropped land which is kept unploughed for a season during the current year mainly to regain soil fertility. The fallow land other than current fallow includes all those areas which have been temporarily kept out of cultivation due to one reason or the other, for a period of at least one year but not more than four years. If such
lands remain uncultivated for more than four years., these are included in the category of culturable waste land. The revenue authorities do not maintain data regarding current fallow. The present discussion, therefore, confines to the second sub-category.

Spatial pattern of change in fallow land during 1951-80

The Bist Doab had 10.8 per cent (98,571 hectares) of its total area under the category of fallow land in 1951. The proportion came down to 4.1 per cent (37,663 hectares) in 1966 and to only 0.9 per cent (7,898 hectares) in 1980. To a great extent, the reduction in fallow land is directly related with the increase in net area sown. It means, all those factors which brought an increase in net area sown, generally are true for decline in fallow land. Growing pressure of population and consequent need for the regular use of each bit of land created conditions for the reduction of fallow land. Such a development was, however, facilitated by the extension of irrigation, adoption of improved agronomic practices, control on floods and adoption of soil conservation measures. The decrease in fallow land in the Bist Doab varies areally, ranging from 0.6 per cent in Dhak circle of Nawanshahr tahsil to 26.4 per cent in Bet circle of Sultanpur tahsil (Map 3.8). Generally, the spatial variations in decrease in fallow land are directly proportional to the availability of such land at the beginning of the study period (Maps 3.5 to 3.8).

The southwestern Bist Doab, comprising Bet and Dona tracts of the Kapurthala and Sultanpur tahsils, Dona and Manjki circles of Nakodar tahsil and Dona Lehnda and City Circle of Jalandhar tahsil, constitute a contiguous tract where fallow land recorded greater (between 16 and 27
per cent) decrease. The decline in fallow land in Bet areas is attributed to the flood control measures taken by the government. Prior to their damming, the two rivers used to spread sand and silt on soils through frequent floods thereby keeping some lands temporarily out of cultivation. The control on floods and associated problems helped in extending regular cultivation to such lands. Decrease in fallow land in Dona tract (area associated with aeolian deposits), is largely the result of increase in irrigation. In this tract, irrigation, largely through tube-wells and pumping sets was extended after levelling the mounds of sand which were previously put to irregular cultivation.

Moderate decline, ranging between 6 and 16 per cent in the proportion of fallow land was noticed in central parts of upland plain, in almost whole of the flood plain of the Satluj and in northern part of the flood plain of the Beas along with some adjacent areas. Unlike the Dona tract, the proportion of fallow land in these parts was relatively low in the beginning of the study period. With the development of irrigation, particularly over the upland plain, and with the check on floods and reduction in water-logging in the low lands, whatever fallow land was available, could be pressed under regular cultivation.

Low decrease (below 6 per cent) in fallow land is a feature of the hilly and the foothill zone and adjoining parts of the upland plain. The former type of areas are prone to soil erosion and had large tracts of marginal land. But irrigation could not make much headway over here. Under these circumstances, the lands which were designated as fallow could not be brought under regular cultivation to a notable extent. However, low
decline in neighbouring parts of the upland plain is due to the fact that most of the fallow land over here was put to regular ploughing in 1951 and therefore, a limited scope was left for its further curtailment.

Spatial pattern in 1980

As a result of continuous diminution of fallow land since early fifties, only 0.9 per cent (7,898 hectares) of the total area of the Bist Doab remained under this category in 1980. Out of a total of 35 assessment circles in the region, as many as 28 have less than one per cent of their area under fallow land (Map 3.7). With the exception of Bet circle of Nawanshahr tahsil where its percentage is 3.4%, the proportion of fallow land in all other assessment circles hardly reaches two per cent of their area. All those assessment circles, in which fallow land is above one per cent are associated either with the flood plains or with the hilly and foothill parts.

In short, the proportion of fallow land in the Bist Doab came down to a bare minimum. The decline in this land use category, however, varies. It is largely a function of its availability in 1951. Growing pressure of population, development of irrigation, increase in farm mechanization, improvement in agronomic practices, growing commercialization in farming, flood control and soil conservation measures largely brought down the proportion of fallow land in the region. At present, only a few problem areas in the flood plains, the hills and dissected foothill plain display relatively high percentage of fallow land. In other parts, the area under this land use category has reduced to a minimum.
Culturable Waste Land

Culturable waste land refers to the potential land over which cultivation can be extended with some effort. It includes the land which has gone out of cultivation and has remained so, at least for four consecutive years, due to some physical problems. Permanent pastures and other grazing lands, village commons, swamps and marshes are also included in this category.

Spatial pattern of change in culturable waste land during 1951-80

Culturable waste land comprised 12.0 per cent (109,631 hectares) of the total area of the Bist Doab in 1951. It came down to 8.9 per cent (80,212 hectares) in 1966 and to 2.8 per cent (25,094 hectares) in 1980 (Maps 3.9 to 3.11). Increase in population pressure and consequent need to extend cultivation on new and marginal lands; enactment of land reforms such as termination of zamindari system of tenure, ceiling on landholdings, provision of ownership rights to tenants and consolidation of holdings are the chief factors which brought this change. Besides, the development of irrigation and improvement in agronomic practices facilitated the subjugation of such land. The decline in its proportion, however, varies markedly over different parts of the Bist Doab (Map 3.12).

Maximum decrease, ranging between 17.2 and 31.2 per cent is a feature of the whole of Kapurthala district. As mentioned earlier, this district had considerably high (between 16.9 and 24.1 per cent) proportion of its area under culturable waste land in 1951 (Map 3.9). This is because, it remained under the feudal rule before and even a few years after Independence. The local ruler had reserved large pockets of agricultural land
BIST DOAB
CULTURABLE WASTE LAND
(Data by Assessment Circles)

As Percentage of total area

No. of Units

Significant Values
Highest 46.0%
Lowest 1.0%
Mean 12.0%

Change 1951-80

Source Unpublished Revenue Records (Lai Kitabs)
as hunting grounds. Besides, Bet assessment circles of this district, like the other bet areas, were suffering from floods and waterlogging, particularly before the construction of Pong Dam on the Beas. In its Phagwara tahsil, similar problems were created by the east Bein. Apart from these, the Dona assessment circles of the district were having vast sandy areas associated with aeolian deposits as culturable waste land. Abolition of princely rule, check on floods and waterlogging, development of irrigation, and improvement in agronomic practices went a long way in the curtailment of culturable waste land in this district.

Kandi and Rakkar assessment circles of Dasuya tahsil, Kandi circle of Hoshiarpur tahsil and Dhaha Bet circle of Nawanshahr tahsil too recorded high decrease (above 16 per cent) in culturable waste land. These areas had high proportion (between 12 and 49.2 per cent) of their land under this land use category in 1951. The channelization and diversion of seasonal streams in the case of first three assessment circles paved the way for pressing most of the culturable waste land under the plough. In Dhaha Bet circle of Nawanshahr tahsil, high decline in culturable waste land is ascribed to the reclamation of waterlogged and saline and alkaline patches during the study period.

In comparison to the above mentioned areas, the whole of Jalandhar and Phillaur tahsils, most of Nakodar tahsil, Retli circle of Nawanshahr tahsil, Sirowal circle of each of the Hoshiarpur, Garhshankar and Balachaur tahsils, and Maira circle of Dasuya tahsil registered low decline (below 8 per cent) in the proportion of culturable waste land during 1951-80. Excluding
Sirowal circle of Hoshiarpur tahsil, all other areas falling in this category had low proportion of their area under culturable waste land in 1951. They were already put to intensive cultivation. A limited proportion of their area was under culturable waste land which too has been brought under cultivation through the development of irrigation and application of advanced methods of farming. Thus, the decrease in their case happened to be low. Sirowal assessment circle of Hoshiarpur tahsil, however, had high proportion of cultivable wastes in 1951. But it witnessed low decrease mostly because of continued soil erosion. Channelization of streams and narrowing down their courses through afforestation could not succeed to any notable extent.

The culturable waste land registered moderate (between 8 and 16 per cent) decrease in flood plain of the Satluj; Kandi-Rakkar assessment circles of both Garhshankar and Balachaur tahsils; and Dhak assessment circle of Nawanshahr tahsil. These areas had 8 to 16 per cent of their land under this land use category in 1951, the reclamation of which largely resulted into the decrease of the same range. Reduction in floods and waterlogging due to the damming of the river in the case of the flood plain of the Satluj facilitated its reclamation for cultivation. But in case of Kandi assessment circle which has hilly terrain and is dissected by seasonal streams, channelization of choes and afforestation, improvement in methods of farming are responsible for reducing the proportion of culturable waste land. As already stated, channelization could not bring much success in Rakkar assessment circles of the two tahsils. Also most of the culturable waste land here was diverted to afforestation. Decrease in case of Dhak assessment circle of Nawanshahr tahsil is associated largely with the development of irrigation and improvement in agronomic practices.
In sharp contrast to the areas discussed above, Bet and Sirowal assessment circles of Dasuya tahsil and Kandi assessment circle of Hoshiarpur tahsil experienced increase of 3.0, 1.4 and 2.5 per cent respectively in culturable waste land during the study period. Emergence of waterlogging in Bet circle of Dasuya tahsil, increase in soil erosion in Sirowal and Kandi circle of Hoshiarpur tahsil which are badly infested by seasonal streams, largely account for increase in area under this land use category.

The above discussion clearly reveals that decrease in proportion of culturable waste land in the Bist Doab is directly associated with its availability in 1951. The greater was its proportion in 1951 in an area, the higher has been its decline.

Spatial pattern in 1980

Culturable waste land covered only 2.8 per cent (25,094 hectares) of the total area of the Bist Doab in 1980. A large proportion of this land is marginal. It suffers from serious physical problems such as soil erosion and swampy conditions. Out of a total of 35 assessment circles in the region, only five display relatively high (above 6 per cent) proportion of culturable waste land (Map 3.11). These are Kandi and Rakkar assessment circles of Hoshiarpur tahsil and Kandi, Rakkar and Bet assessment circles of Dasuya tahsil. Severe soil erosion and presence of marginal lands in larger amount along seasonal streams and along hill slopes explain its higher proportion in Kandi-Rakkar areas of the two tahsils. But its high percentage in Bet circle of Dasuya tahsil is due to the presence of waterlogging and continued swampy conditions. Rest of the Bist Doab has less than 6 per cent of its
area under the category of culturable waste land.

In brief, most of the culturable waste land in the Bist Doab has been pressed under the plough. Growing pressure of population, extension of irrigation, improvement in methods of farming and mechanization of agriculture, account for this. Decrease in its proportion, however, has been higher in areas where it was available in greater amount in 1951. At present, less than 1.0 per cent of the total area of most of the Bist Doab is culturable waste. Only those areas where soil erosion and waterlogging are still continuing, has relatively high amount of land under this category.

**Land Not Available for Cultivation**

As its name implies, it is that land which is not available for cultivation. It is of two types: (i) land put to non-agricultural uses. It is the land which is utilized by man for constructing settlements, roads, railways, canals, wells, industrial establishments etc.; (ii) land which is barren and cannot be cultivated due to some natural problems. Land under hills, deserts, lakes, ponds, drainage lines etc. falls in this sub-category.

**Spatial pattern of change in land not available for cultivation during 1951-80**

Land not available for cultivation occupied 18.8 per cent (171,151 hectares) of the total area of the Bist Doab in 1951 (Map 3.13). The proportion increased marginally to 19.0 per cent (173,716 hectares) in 1966. But after 1966, it started declining and came down to 11.5 per cent (103,053 hectares) in 1980. It means, that whole of the decrease in the area under this land
use category came during the post-Green Revolution period (Map 3.14 and 3.15). Check on floods and consequent decrease in waterlogging, diversion of a large number of seasonal streams into major channels; narrowing down their courses by planting trees; levelling of sand dunes in the affected areas made some unavailable lands available for cultivation. Extension of cultivation on such lands accounted for their decrease. The area brought under the plough from this category of land use, however, has been greater than the encroachment of agricultural land by developmental and non-agricultural uses. Thus, it recorded an overall decrease. The decline, however, varies areally from one part of the region to another (Map 3.16).

A sharp fall ranging between 15.2 and 46.8 per cent in land not available for cultivation took place in Kandi belt of the Bist Doab. This belt is associated with dissected Shiwalik hills. Soil conservation measures in the form of afforestation along hill slopes and stream courses and improvements in methods of hill farming facilitated the extension of cultivation on some of the lands which previously were designated as not available for cultivation. Flood plain of the Satluj in Balachaur and Nakodar tahsils too registered high decline (49.5 and 24.2 per cent respectively). Obviously, this was made possible after the damming of the river at Bhakhra. By this measure, water course of the river became narrow and waterlogging in the flood plain decreased to a great extent. As a result, enough of land was made available for cultivation which previously was not so.

Most of the remaining areas of the Bist Doab witnessed moderate to low decline ranging between 0.1 and 8.9 per cent in the proportion of...
BIST DOAB
LAND NOT AVAILABLE FOR CULTIVATION
(Data by Assessment Circles)

Significant Values
Highest: 70.5%  
Lowest: 9.3%  
Mean: 16.6%

As percentage of total area

1951

No. of Units: 8
Percentage of total area: 16%

1966

No. of Units: 8
Percentage of total area: 8%

1980

No. of Units: 8
Percentage of total area: 16%

Change 1951-80

No. of Units: 8
Change in percentage: Increase

Source: Unpublished Revenue Records (Lai Kitabs)
land not available for cultivation. Areas of low decline include Bet of Beas in Kapurthala and Sultanpur tahsils and that of the Satluj in Nawanshahr tahsil; the foothill plain in Balachaur, Garhshankar, Dasuya and parts of Hoshiarpur tahsil and parts of the upland plain in Jalandhar, Phillaur and Phagwara tahsils. Continuation of waterlogging in case of the flood plains; continued dissection of land and erosion of soils in above mentioned parts of the foothill plain; and limited availability (in 1951) of land not available for cultivation in the upland plain largely explain the low decline in area under this land use category. Maira assessment circle of Dasuya tahsil and Dona-Manjki tract of Kapurthala and Nakodar tahsils experienced moderate decrease in proportion of land not available for cultivation. The decline in case of Maira assessment circle, is attributed to the closure of Shah Nahr canal and the eradication of waterlogging from most of the affected patches. But in Dona-Manjki areas, the levelling of large sand dunes brought this decline.

In sharp contrast to the areas discussed above, 8 out of 35 assessment circles of the Bist Doab experienced increase in proportion of land not available for cultivation. These include City Circle and Dona Charda assessment circles of Jalandhar tahsil and Dhak, Dhaha Bet and Retli assessment circles of the Nawanshahr tahsil. All these areas recorded considerable increase in the use of land for non-agricultural purposes which resulted in an overall increase in area under this category. Bet assessment circle of Dasuya tahsil also falls in this category. Here, the problem of waterlogging continued throughout the study period and it increased after the heavy rains of mid-sixties. As a result, proportion of land not available for cultivation increased. The Rakkar
assessment circle of Hoshiarpur tahsil and Sirowal assessment circle of Phagwara tahsil are the other areas where too proportion of land not available for cultivation recorded increase during 1951-80. Increase in these areas is attributed largely to unchecked erosion and spread of sand by local streams. Channelization of these streams could not make much headway and hence an addition to area under this category. This apart, the expansion of urban activities due to increase in size of Hoshiarpur and Phagwara towns (located respectively in the two assessment circles) also brought increase in the proportion of land not available for cultivation.

Spatial pattern in 1980

The land not available for cultivation in the Bist Doab occupied 11.5 per cent (103,053 hectares) of its total area in 1980. This percentage, however, is not true for all areas of the region. It varies significantly from 0.1 per cent in Sirowal assessment circle of Garhshankar tahsil to 44.6 per cent in Kandi assessment circle of Hoshiarpur tahsil (Map 3.15).

High (above 16 per cent) and moderately high (between 8 and 16 per cent) proportion of area under this land use category is a feature of: (i) parts of hilly and foothill tract in Hoshiarpur and parts of Garhshankar tahsil, where unfavourable topography and presence of a large number of seasonal streams have rendered large areas unfit for cultivation; (ii) entire flood plain of the Beas and a part of that of the Satluj in Nawanshahr tahsil, where river courses cover significant area and patches of marshy and swampy land could not be made available for cultivation during the
study period; and (iii) central and southcentral Bist Doab where a considerable area is devoted to developmental activities.

Leaving aside these areas, the proportion of land not available for cultivation in the region is low (below 8 per cent). About one-half (17 out of 35) assessment circles of the Bist Doab fall in this category. These comprise whole of Nakodar tahsil, Dona circle of Kapurthala tahsil, Manjki circle of Phagwara tahsil, whole of Dasuya tahsil (except its Bet circle), Sirowal and Rakkar circles of Garhshankar tahsil and whole of Balachaur tahsil. In these areas the proportion of land not available for cultivation varies between 0.1 and 6.9 per cent. It includes mostly that land which is devoted to non-agricultural uses on a normal scale. However, the presence of a few mounds of sand in Dona assessment circles, seasonal streams in Sirowal-Rakkar-Kandi areas and swampy pockets in Bet assessment circles too contribute to this land use category in these areas.

Forests

All those areas which are actually wooded and are classed and administered as forests through certain laws, irrespective of their ownership, come under the category of forests. These may be owned by the individuals or by the government.

The Bist Doab had only 0.3 per cent (2,770 hectares) of its total area under forests in 1951. With a marginal increase of 0.04 per cent
the proportion remained almost the same till 1966. However, it increased remarkably to 5.9 per cent (52,824 hectares) of the total area of the region in 1980. Therefore, most of the increase in area under forests took place during second half of the study period. This is because, afforestation in hilly tract as a measure of soil conservation was taken up seriously after 1966. Various forests and soil conservation programmes were also intensified by the government after mid-sixties. Planting of trees particularly eucalyptus and poplar, along roads, railways, canals, etc. by the forest department; and by the individuals on marginal lands as well as on lands owned by absentee landlords brought this change of higher magnitude. Different parts of the Bist Doab experienced different amounts of increase and thus have differential proportions of area under this land use category (Map 3.17 and 3.18).

The eastern hilly and foothill zone recorded the highest increase (above 30 per cent) purely because it offered a wide scope for the expansion of area under forests. Considerable part of this tract is barren and marginal for agriculture but is suitable for tree plantations. Being aware of the damage caused by hill torrents during rainy seasons, government gave due attention to this zone and emphasized afforestation along bare hill slopes and choe banks in order to check erosion. Thus, this area has the highest proportion of forests in the Bist Doab. The remaining parts of the region, witnessed a very low increase in this regard and hence are least wooded. Obviously, these parts of the Bist Doab have fertile alluvial soils over which the cultivation of crops is far more profitable than that of the trees.
BIST DOAB
Forests as percentage of total area: 1980
(Data by assessment circles)

Significant Values
Highest........44-6%
Lowest........0-1%
Mean..........5-9%

Source Unpublished Revenue Records (Lai Kitobs)
BIST DOAB
Change in percentage of forests: 1951-80
(Data by assessment circles)

Change in Percentage

- Above 20
- 10-15
- Below 2
- N Nil

Significant Values
Increase
Highest 44.6%
Lowest 0.1%
Mean 5.6%

Source: Unpublished Revenue Records (Lai Kitabs)
Land Use Regions

On the bases of changes in and existing patterns of area under various land use categories discussed above, the Bist Doab may be divided into the following three land use regions (Map 3.19):

1. Least dynamic and intensively cultivated upland plain;
2. Most dynamic and intensively cultivated flood plain;
3. Moderately dynamic and least cultivated region associated with the hills and adjoining parts of the foothill plain.

1. Least dynamic and intensively cultivated upland plain

Covering 55 per cent of the total area of the Bist Doab, this land use region spreads over most of the upland plain and adjoining parts of the foothill plain. This region was under intensive cultivation even in 1951. Nearly three-fourth (73.2 per cent) of its area was under net cultivation. The proportion of culturable waste land and fallow land was low. Nearly flat topography, fertile alluvial soils, high pressure of population and considerably developed irrigation largely explain this situation. Due to already broad base of cultivation, the scope for its further expansion was limited. That is why, it displayed lesser dynamism in matters of agricultural land use. Whatever amount of culturable waste land and fallow land was available in 1951, was
Least Dynamic and Intensively Cultivated Upland Plain

Most Dynamic and Intensively Cultivated Flood Plain

Moderately Dynamic and Least Cultivated Region Associated with the Hills and Adjoining Parts of the Foothill Plain
largely brought under the plough during 1951-80. In 1980, 85.9 per cent of its land was under net cultivation, 2.0 per cent was under culturable waste land and 1.6 per cent was designated as fallow land. Forests covered 1.7 per cent of total area of this land use region in 1980. As such, it is the most intensively cultivated and agriculturally the most developed part of the Bist Doab. Its agricultural resource base has stretched to the farthest limits. Increasing use of good agricultural land for developmental activities, however, is a serious problem which needs rationalization.

2. Most dynamic and intensively cultivated flood plain

This land use region covers one-fourth (24.8 per cent) of the total area of the Bist Doab. It includes flood plains of the two rivers (except in Dasuya tahsil) and the western fringe of the upland plain. These areas either were suffering from floods and waterlogging or were ruled by the local Princes or had both types of characteristics. Damming of the two rivers and termination of feudal rule along with considerable extension of irrigation (especially in western fringe of upland plain) brought significant changes in agricultural land use of this region. Almost all of its culturable waste lands and fallow lands were pressed under the plough. Vast areas which formerly were not available for cultivation, due to serious physical handicaps were also made available for the purpose by 1980. As a result, agricultural resource base of this region broadened very fastly. The proportion of net area sown almost doubled. It increased from 42.2 per cent in 1951 to 83.2 per cent in 1980. The fallow land and culturable waste land came down equally sharply. No other region matches it in terms of changes in land use. As a result of fast extension of cultivation, its agricultural
resource base has risen to the level of the neighbouring upland plain and thus it has become equally intensive in cultivation.

3. Moderately dynamic and least cultivated region associated with the hills and adjoining parts of the foothill plain

Running parallel to the eastern boundary of the Bist Doab, this land use region is confined to the Kandi-Rakkar belt. It occupies about one-fifth (20.2 per cent) of the total area of the study region. As regards the changes in its agricultural land use during 1951-80, this region falls in between the former two land use regions. The changes here have been higher than the neighbouring upland plain but lower than the flood plain.

The proportion of net area sown in this land use region increased from 37.6 per cent in 1951 to 54.3 per cent in 1980, largely through the extension of cultivation to culturable waste land and fallow land. Proportion of area under these land use categories decreased from 18.8 to 5.9 per cent and from 3.9 to 0.7 per cent respectively during the study period. Vast tracts of land which were lying under stream courses and hill slopes were also brought under the plough, or were planted with trees. As a result, the proportion of land not available for cultivation came down from 38.2 to 17.6 per cent and that of the forests increased from 1.5 to 21.5 per cent. Evidently, this land use region is the most forested part of the Bist Doab. Afforestation in this tract was emphasized particularly by the government to check natural run-off and soil erosion. A large number of trees has been planted along hill slopes and banks of the local streams. It was the least cultivated in
1951, recorded lower increase in cultivation during 1951-80 and is far behind the other two land use regions of the Bist Doab in agricultural resource base. Under prevailing physical set up, further extension of cultivation to any notable extent is a remote possibility.

Conclusion

Land use patterns of the Bist Doab experienced considerable changes during 1951-80. Its agricultural resource base extended to the farthest limits. Near saturation in agricultural resource base was mostly brought by extending cultivation on almost all the available lands. A large number of factors, such as, increase in population pressure and consequent increase in demand for land, development of irrigation, use of better agronomic practices, enactment of land reforms, increase in farm returns, greater awareness among farmers towards farming etc. played a significant role in bringing this positive development. In the wake of restricted scope for further extension of cultivation and ever growing population, the land of the Bist Doab needs careful planning. Greater emphasis needs to be placed on intensification through multiple cropping and diversification of agriculture.

The changes in land use, however, are more marked in the flood plains, where flood control measures offered vast tracts of land for the extension of cultivation. Also, because of being relatively less populated, these areas attracted people from the neighbouring overcrowded upland plain. On the other hand, the upland plain recorded less dynamism in matters of agricultural land use, due largely to the already intensive use of land for
agricultural purposes. In this process, the flood plains have come at par with the upland plain in terms of agricultural resource base. The hills and parts of the foothills, experienced moderate change. Uneven terrain and dissection by seasonal streams did not permit the extension of cultivation in these parts to any notable extent. Therefore, these areas continued to lag behind the other two regions, in terms of agricultural resource base.