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Existing Land-Use Patterns in Punjab-Haryana Plain: 2011-14

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ABSTRACT

Major theme of the paper is to reveal the landuse patterns and highlight the factors responsible or uneven distribution of Punjab-Haryana Plain in 2011-14. The study has deduced that share under different categories is the result of physical as well as human environment. Being a plain area with the exception of shiwaliks and offshoots of Aravallis, the study region is suitable for agriculture. It is noted that area under forest land, barren land and non- agricultural land is 3.30 per cent, 1.67 per cent and 10.88 per cent respectively. While the cultivable wasteland and current fallow & fallow land have 0.29 per cent and 1.98 respectively. 81.40 per cent of the total reporting area is under net sown area which is recorded highest in Sirsa district i.e. 92.11 per cent and lowest of 43.06 per cent in Faridabad district. Hoshiarpur district has revealed highest area of 31.21 per cent under forest land. Barren land is maximum in Mewat district i.e. 9.91 per cent. While highest of 52.78 per cent of non- agricultural land is registered in Faridabad district i.e. 52.78 per cent. Thus further scope of extension of cultivated area is very limited in the study region because only 0.29 per cent is under cultivable wasteland. Current Fallow & Fallow Land combinedly has 1.98 per cent of the total reporting area. All this shows that the relief, rainfall, extent of irrigation, degree of mechanization, industrialization, urbanization, etc. have their direct effect on spatial patterns of landuse in the study region. Present study is based on secondary sources of data. The district is selected as unit of study.

Keywords: *landuse, spatial, non-agricultural land, net sown area, human environment, cultivable waste land.*

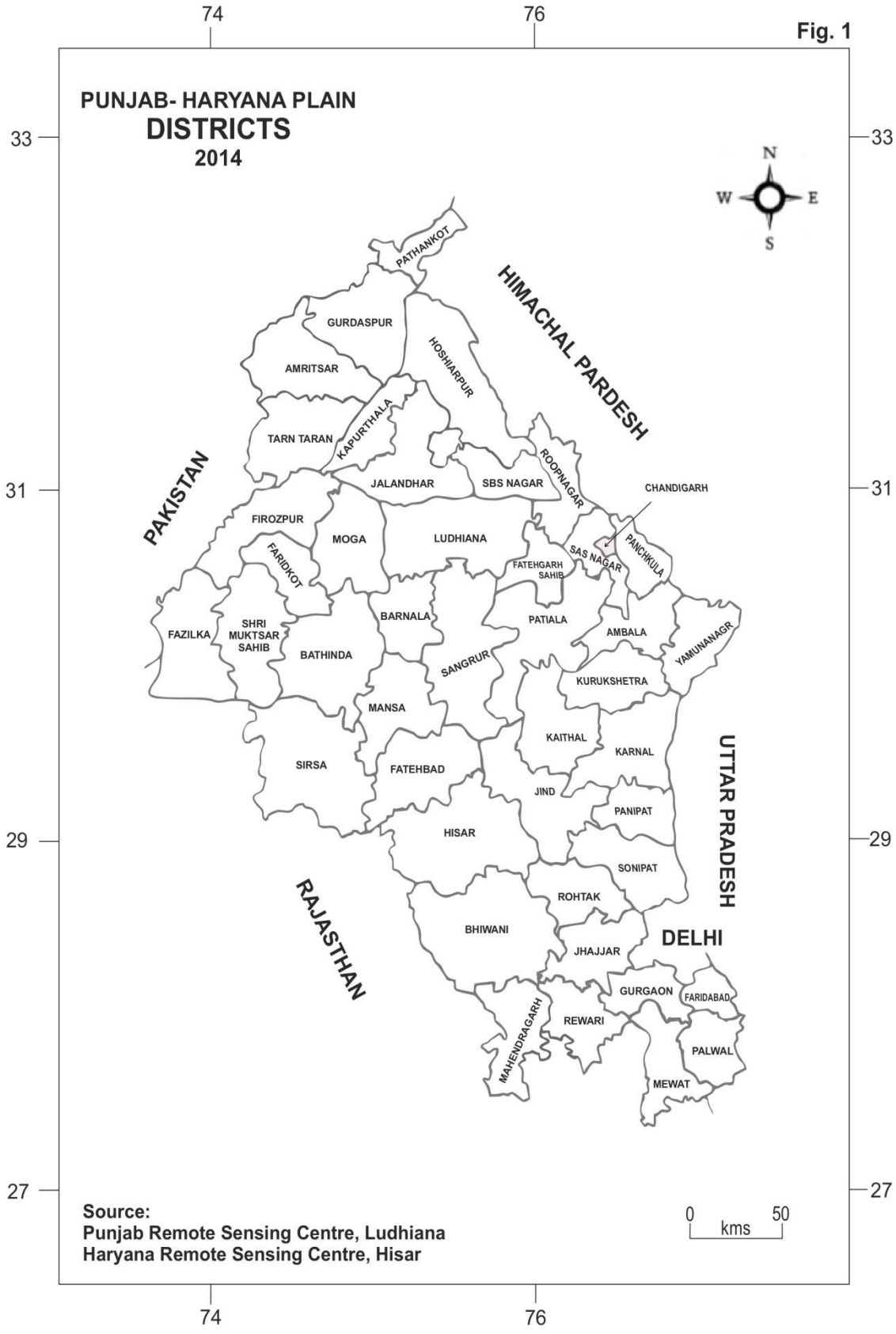
Introduction

When Stamp had carried out land utilization survey in Britain during mid-1930s, the importance of the study of landuse has become a vital subject for geography His work was published in 1948 in book form under the heading "The Land of Britain- Its Use and Misuse". The International Geographical Union was so impressed by his work that in 1949, it has appointed a commission to study the world landuse survey and Valkenburg in 1950 became first chairman of this commission who has put forward the concept of world landuse survey. In India, Dayal (1950) had done a remarkable work related to agricultural landuse pattern in India. Some more important scholars who worked on landuse pattern in India are Baker, O.E. (1923), Buck (1937), Coleman, A. (1961), Shafi (1969), Clawson, M. and Stewart, C.L. (1965), Bhatia (1965), Chauhan (1966), Singh (1974), Sohal (1979), Roy (1968), Datta, Devi (1988) etc. Besides these scholars, several more geographers and economists have also carried out their research on landuse study at state, district, tehsil and village level. For increasing agricultural production and rational landuse planning, the Ministry of Food and Agriculture of India in 1948 has set-up a Technical Committee on Co-ordination of Agricultural Statistics (TCCAS) which has recommended 9 landuse categories namely forest land, barren land, non-agricultural land, area under miscellaneous tree crops, pastures-meadows-grasslands, cultivable wastelands, fallow land, current fallow land and net sown area. Since 1950, all data related to landuse in India is collected uniformly on these 9 landuse categories at village level. Symons (1978) stressed that landuse study is the spearhead for the advancement of geography, because maps of landuse are essential tools for regional planning and development. The study of landuse patterns is of utmost importance for geographers to understand the relationship between human and physical environment (Tripathi and Vishwakarma, 1988). Asurd (2000) has analysed that landuse pattern is the sequence of area under different landuse which also becomes a base for agricultural planning. Ramasamy, et al (2005) has observed that land is the basic input for agriculture and has occupied first place among resources required for the development of economy. Thus, the present scholars have felt the dire need to study landuse patterns for healthy agricultural development of the study region; therefore an attempt is made in right direction in this paper to explain the existing landuse patterns of Punjab-Haryana Plain.

Study Area (Fig. 1)

The Geographical extent of Punjab-Haryana plain ranges between 73°55' E longitude to 77°46' E longitude and latitudinal extent lies between 27°37' N latitude to 32°33' N latitude. It comprises of 2.88 per cent of the total reporting area of the country. It forms international boundary with Pakistan in the north-west and share state boundaries with Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Rajasthan, Union Territories of Delhi and Chandigarh. From relief point of view, there are outcrops of Aravallis, Sand dunes, Piedmont plains, Shivalik hills, plains etc. The study region is blessed with four perennial rivers and one seasonal river. Average annual rainfall is about 60 cm and temperature during summer normally touches upto 46°C and during winters the minimum temperature even fall upto freezing point. A variety of soils are found namely silty clay, clayey, loamy, sandy, fine sandy etc. According to 2011 census, its total population is 5, 3096,419 persons. There are total 43 districts for administrative purposes.

Fig. 1


PUNJAB- HARYANA PLAIN
DISTRICTS
2014
74
76
33
31
29
27
N
W
E
S
PAKISTAN
HIMACHAL PARDESH
UTTAR PRADESH
RAJASTHAN
DELHI
CHANDIGARH
PATHANKOT
GURDASPUR
AMRITSAR
HOSHIARPUR
TARN TARAN
KAPURTHALA
JALANDHAR
SBS NAGAR
ROOPNAGAR
FIROZPUR
MOGA
LUDHIANA
FARIDKOT
FATEHGARH SAHIB
SAS NAGAR
PANCHKULA
FAZILKA
SHRI MUKTSAR SAHIB
BATHINDA
BARNALA
PATIALA
AMBALA
YAMUNANAGR
SANGRUR
KURUKSHETRA
MANSA
KAITHAL
KARNAL
SIRSA
FATEHBAD
JIND
PANIPAT
HISAR
SONIPAT
ROHTAK
BHIWANI
JHAJJAR
GURGAON
FARIDABAD
REWARI
MAHENDRAGARH
PALWAL
MEWAT
Source:
Punjab Remote Sensing Centre, Ludhiana
Haryana Remote Sensing Centre, Hisar
0
50
kms

Objectives

1. To reveal the existing landuse patterns of 2011-14
2. To highlight the factors affecting landuse patterns.

Hypothesis

Geo-socio-economic factors largely determine the landuse patterns of a region.

Methodology

The study of landuse pattern is based on secondary sources of data. District is taken as unit of study. Three years averages are drawn for 2011-14. Simple percentages are calculated for deriving the results. The cartographic technique is applied for mapping the results.

Discussion and Results

1. Forest Land (Fig. 2)

Forest land is any piece of land which is declared as forest through legal enactment by the Union Ministry of Agriculture and Forestry is called Forest Land. The study has recorded 3,10,000 hectares area under forest land which contains 3.30 per cent of the total reporting area and varies from no forest land in 6 districts namely Sonipat, Rohtak, Jhajjar, Faridabad, Mewat and Fatehabad to 31.21 per cent in Hoshiarpur district. For investigating the spatial patterns of forest land and reasons responsible for it, table no. 1 is prepared and fig. 2 is mapped which presents four distinct categories:

a. Areas with High Category of Forest Land (>5 per cent)

It comprises of 7 districts with 16.28 per cent of total occurrences. This region has shiwalik strip which runs like a wall from northwest to southeast direction covering Gurdaspur, Rupnagar, Pathankot, Hoshiarpur S.A.S. Nagar, S.B.S. Nagar and Yamunanagar districts. In 2011-2014, minimum forest land of 5.58 per cent is recorded in Gurdaspur district and maximum of 31.21 per cent in Hoshiarpur district. Hilly tracts, dissected and undulating topography along with some areas affected by seasonal streams called choes, draining into river Ravi, Beas, Sutlej, Ghaggar and Yamuna which cause soil erosion; low degree of urbanization etc. are responsible factors that contribute to areas with high category of forest land.

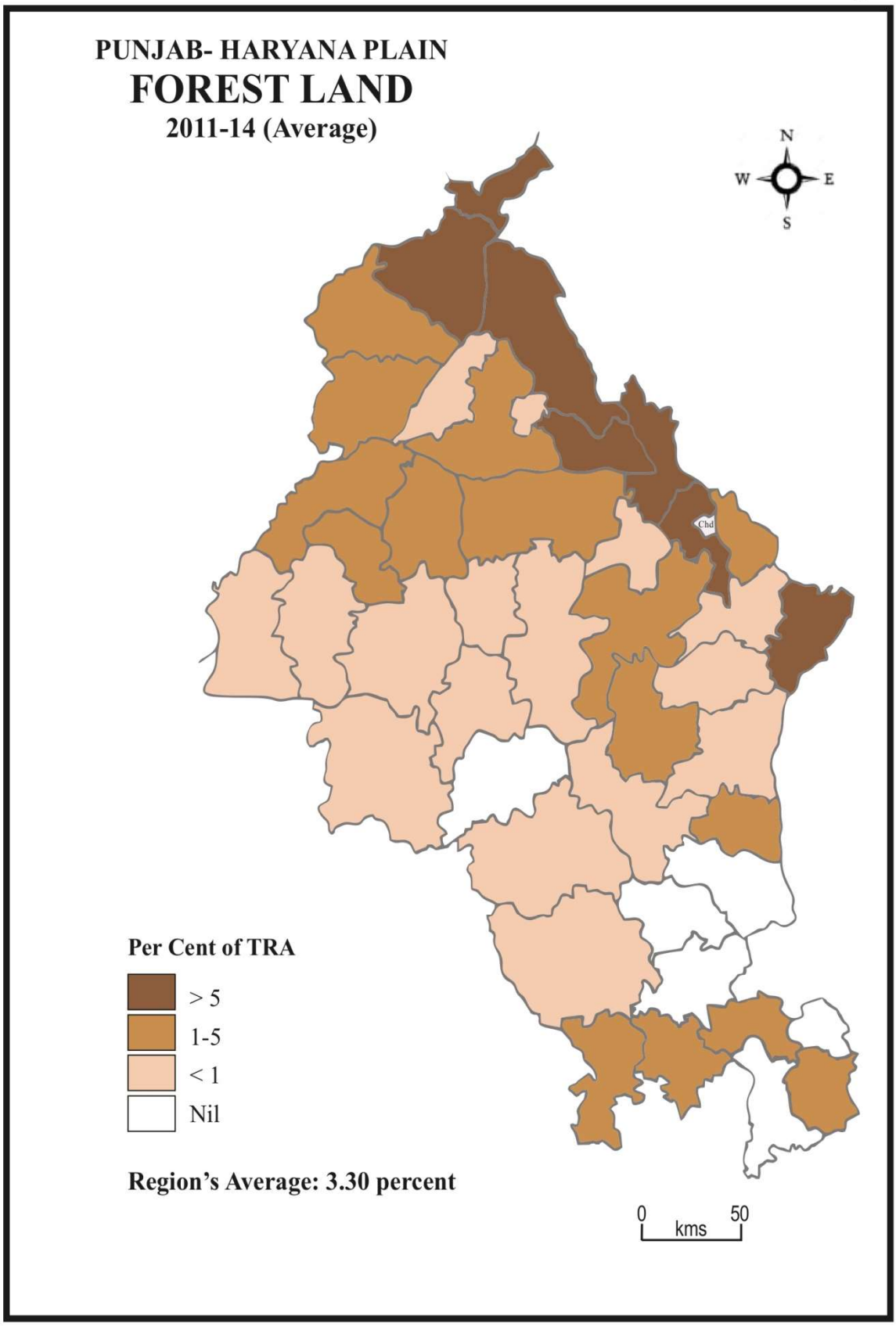
Table No. 1
Forest Land in Punjab-Haryana Plain: 2011-14

Sr. No.	Districts	Per Cent of TRA
1	Gurdaspur	5.58
2	Pathankot	18.48
3	Amritsar	2.02
4	Tarn Taran	2.08
5	Kapurthala	0.80
6	Jalandhar	2.25
7	S.B.S. Nagar	12.63
8	Hoshiarpur	31.21
9	Rupnagar	23.63
10	S.A.S. Nagar	14.40

Sr. No.	Districts	Per Cent of TRA
11	Ludhiana	2.72
12	Firozpur	4.18
13	Fazilka	0.47
14	Faridkot	1.36
15	Shri Muktsar Sahib	0.76
16	Moga	1.19
17	Bathinda	0.79
18	Mansa	0.94
19	Sangrur	0.65
20	Barnala	0.95
21	Patiala	3.72
22	Fatehgarh Sahib	0.87
23	Ambala	0.65
24	Panchkula	1.70
25	Yamunanagar	8.32
26	Kurukshetra	0.59
27	Kaithal	1.17
28	Karnal	0.41
29	Panipat	2.05
30	Sonipat	0.00
31	Rohtak	0.00
32	Jhajjar	0.00
33	Faridabad	0.00
34	Palwal	2.21
35	Gurgaon	2.51
36	Mewat	0.00
37	Rewari	1.32
38	Mahendragarh	1.03
39	Bhiwani	0.57
40	Jind	0.36
41	Hisar	0.25
42	Fatehabad	0.00
43	Sirsa	0.23
	Region	**3.30**

Source: Lal Kitabs of Punjab and Haryana, 2011 to 2014

Fig. 2



Source: District-wise Lal Kitabs of Punjab and Haryana: 2011-2014

b. Areas with Moderate Category of Forest Land (1-5 per cent)

15 districts form moderate category of forest land namely Firozpur, Patiala, Ludhiana, Gurgaon, Jalandhar, Palwal, Tarn Taran, Panipat, Amritsar, Panchkula, Faridkot, Rewari, Moga, Kaithal and Mahendragarh. Here share of forest land ranges from 1.03 per cent in Mahendragarh district to 4.18 per cent in Firozpur district. Reasons for moderate category of forest land includes uncontrolled grazing, increase in demand for fuel-wood collection, subsistenance agriculture, illegal mining, tree felling and encroachments in districts such as Gurgaon, Palwal, Panipat, Panchkula, Rewari, Kaithal and Mahendragarh, covering the Aravalli range. The districts in Punjab that share a border with Pakistan such as Firozpur, Tarn Taran, and Amritsar have been actively involved in tree plantation to increase green cover in the region. However, the remaining districts have small strips of forests and small patches of forest land that have survived because of strong biotic pressure or other factors related to human disturbances.

c. Areas with Low Category of Forest Land (<1 per cent)

In this category, the share of forest land is less than 1.00 percent and accounts for 34.88 per cent of the total occurrences. District Barnala experiences highest percentage in low category of forest land i.e. 0.95 per cent followed by Mansa, Fatehgarh Sahib, Kapurthala, Bathinda, Shri Muktsar Sahib, Ambala, Sangrur, Kurukshetra, Bhiwani, Fazilka, Karnal, Jind, Hisar and Sirsa (0.23 per cent). Areas with low category of forest land is due to high proportion of net sown area, moderate to develop agricultural infrastructure, moderate urbanization etc.

d. Areas with No Forest Land

Lastly areas with non-forest land include districts of Sonipat, Rohtak, Jhajjar, Faridabad, Mewat and Fatehabad.

2. Barren Land (Fig. 3)

Barren land defines as land which is unfit for agriculture and cannot be brought under cultivation with existing technology. These are economically unproductive, ecologically unfit and environmentally degraded lands which include hills, mountains, deserts etc. During the period of 2011-14, the proportion of barren land out of the total reporting area is recorded 1.67 per cent in Punjab-Haryana Plain. The minimum per cent of barren land in the study area ranges from 0.09 per cent in Sangrur district to 9.91 per cent in Mewat district. For explaining the distributional pattern of barren land in the study area, fig 3 has been mapped which shows four categories;

a. Proportion of High Barren Land (> 3 per cent)

The districts fall in high proportion are Mewat, S.A.S. Nagar, Karnal, Bhiwani, Rupnagar, Mahendragarh, Jhajjar, Fazilka, Palwal, Panchkula, Barnala and Sonipat. It varies from 3.30 per cent in Sonipat to 9.91 per cent in Mewat district. The reasons for high share of barren land in S.A.S Nagar, Rupnagar and Panchkula districts, which are located in lower Shivalik foothills and kandi region. These are having undulating and dissected topography that makes these areas prone to water erosion. Additionally the erodible nature of soil combined with high intensity of rainfall in the area contributes to this problem. In contrast, the areas bordering the Thar Desert in Rajasthan experience the problem of soil-salinity, low rainfall and desert soils in parts of Fazilka, Bhiwani and Mahendragarh districts, causing desert erosion and mining activities. Other factors

contributing to prevalence of barren land include lack of irrigation facilities, land degradation and unlevelled topography.

Table No. 2
Barren Land in Punjab-Haryana Plain: 2011-14

Sr. No.	Districts	Per Cent of TRA
1	Gurdaspur	0.78
2	Pathankot	2.17
3	Amritsar	0.00
4	Tarn Taran	0.00
5	Kapurthala	0.00
6	Jalandhar	0.00
7	S.B.S. Nagar	0.53
8	Hoshiarpur	0.29
9	Rupnagar	4.30
10	S.A.S. Nagar	6.09
11	Ludhiana	0.00
12	Firozpur	1.12
13	Fazilka	3.73
14	Faridkot	0.00
15	Shri Muktsar Sahib	1.52
16	Moga	0.30
17	Bathinda	0.00
18	Mansa	0.00
19	Sangrur	0.09
20	Barnala	3.32
21	Patiala	1.24
22	Fatehgarh Sahib	0.00
23	Ambala	1.95
24	Panchkula	3.41
25	Yamunanagar	1.74
26	Kurukshetra	0.59
27	Kaithal	0.44
28	Karnal	5.96
29	Panipat	0.77
30	Sonipat	3.30
31	Rohtak	2.79
32	Jhajjar	4.00

Sr. No.	Districts	Per Cent of TRA
33	Faridabad	2.78
34	Palwal	3.68
35	Gurgaon	0.00
36	Mewat	9.91
37	Rewari	2.87
38	Mahendragarh	4.13
39	Bhiwani	4.45
40	Jind	1.07
41	Hisar	1.48
42	Fatehabad	0.80
43	Sirsa	0.00
	Region	**1.67**

Source: Lal Kitabs of Punjab and Haryana, 2011 to 2014

b. Proportion of Moderate Barren Land (1-3 per cent)

Four districts of Punjab namely Pathankot, Shri Muktsar Sahib, Patiala and Firozpur along with seven districts of Haryana namely Rewari, Rohtak, Faridabad, Ambala, Yamunanagar, Hisar and Jind fall under moderate proportion of barren land and its percentage varies from 1.07 per cent in Jind district to 2.87 per cent in Rewari district. The moderate share of this category in Pathankot, Ambala and Yamunanagar districts is primarily due presence of hills, piedmont plains followed by numerous seasonal streams such as Sukhna choe, Ghaggar, Markanda, Tangri, Chakki etc. Similarly, in Rewari and Faridabad districts, certain broken hills of Aravallis are responsible. However in rest of the districts, moderate share is caused either due to the presence of "birs" or sand dunes.

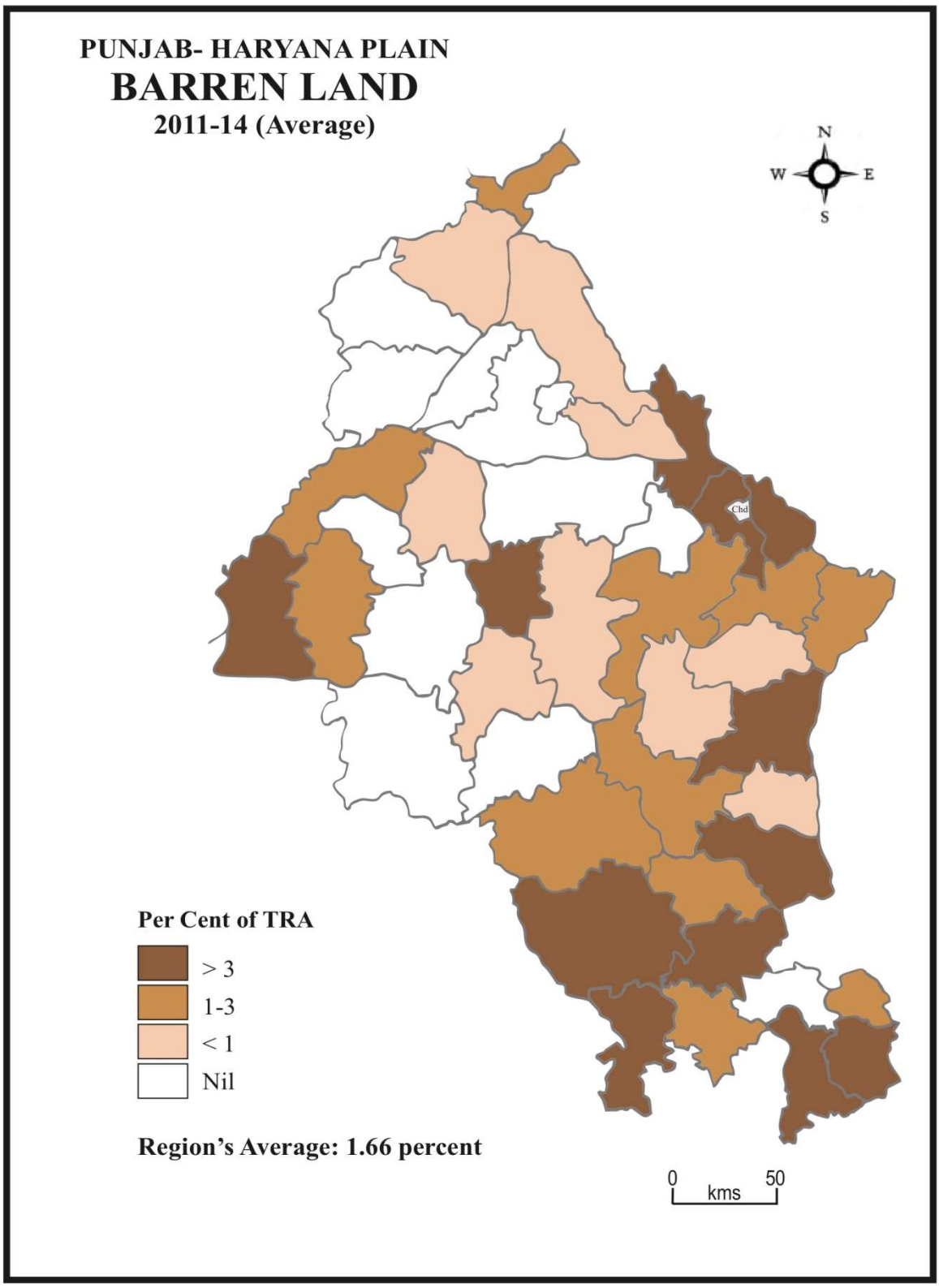
c. Proportion of Low Barren Land (< 1 per cent)

The proportion of barren land in certain districts such as Fatehabad, Gurdaspur, Panipat, Kurukshetra, S.B.S Nagar, Kaithal, Moga, Hoshiarpur and Sangrur is considered low. Here the barren land is recorded less than 1.00 per cent which is negligible and it varies from 0.09 per cent in Sangrur district to 0.80 per cent in Fatehabad district. These are almost plain areas, except for some belts that are severely affected by water erosion.

d. Proportion of No Barren Land

The remaining districts in the study region don't have any barren land and are agriculturally well-developed. Moreover these districts are also free from physical constraints which include Amritsar, Taran Tarn, Kapurthala, Jalandhar, Ludhiana, Faridkot, Bathinda, Mansa, Fatehgarh Sahib, Gurgaon and Sirsa districts.

Fig. 3



Source: District-wise Lal Kitabs of Punjab and Haryana: 2011-2014

3. Non Agricultural Land (Fig. 4)

Lands under settlements, roads, railways, rivers, canals, industries, commercial establishments etc. are known as non-agricultural land. It is also defined as land-use for non-agricultural purposes. This category has 10,23,000.00 hectares which accounts for 10.88 per cent of the total reporting area of Punjab-Haryana Plains 2011-14 and varies from 4.04 per cent in Firozpur district to 52.78 per cent in Faridabad district. For explaining the spatial patterns of non-agricultural land, help is taken from fig. 4 and table no. 3, which portray three categories as below:

a. Areas with High Share (>16 per cent)

There are eight districts in the region with more than 16 per cent of non-agricultural land namely Faridabad, Gurgaon, Panchkula, Ambala, Sonipat, Kapurthala, Yamunanagar and Ludhiana. In Ludhiana the share of non-agricultural land is 16.03 per cent, while in Faridabad it is as high as 52.78 per cent. The reason for areas with high share of non-agricultural land in Sonipat, Gurgaon and Faridabad as these districts lies close to Delhi National Capital Region (NCR) where owing to industrial and commercial development most of the land is captured by industries, rail-road network, settlements etc. In Panchkula, Ambala and Yamunanagar districts, the reasons are influence of Chandigarh city, industralization, urbanization etc. In case of Ludhiana, which is an industrial hub of Punjab most of the land has been occupied by expansion of industries, settlements, commercial establishments etc. The establishment of rail coach factory at Kapurthala is major cause of high share of non-agricultural land in this district.

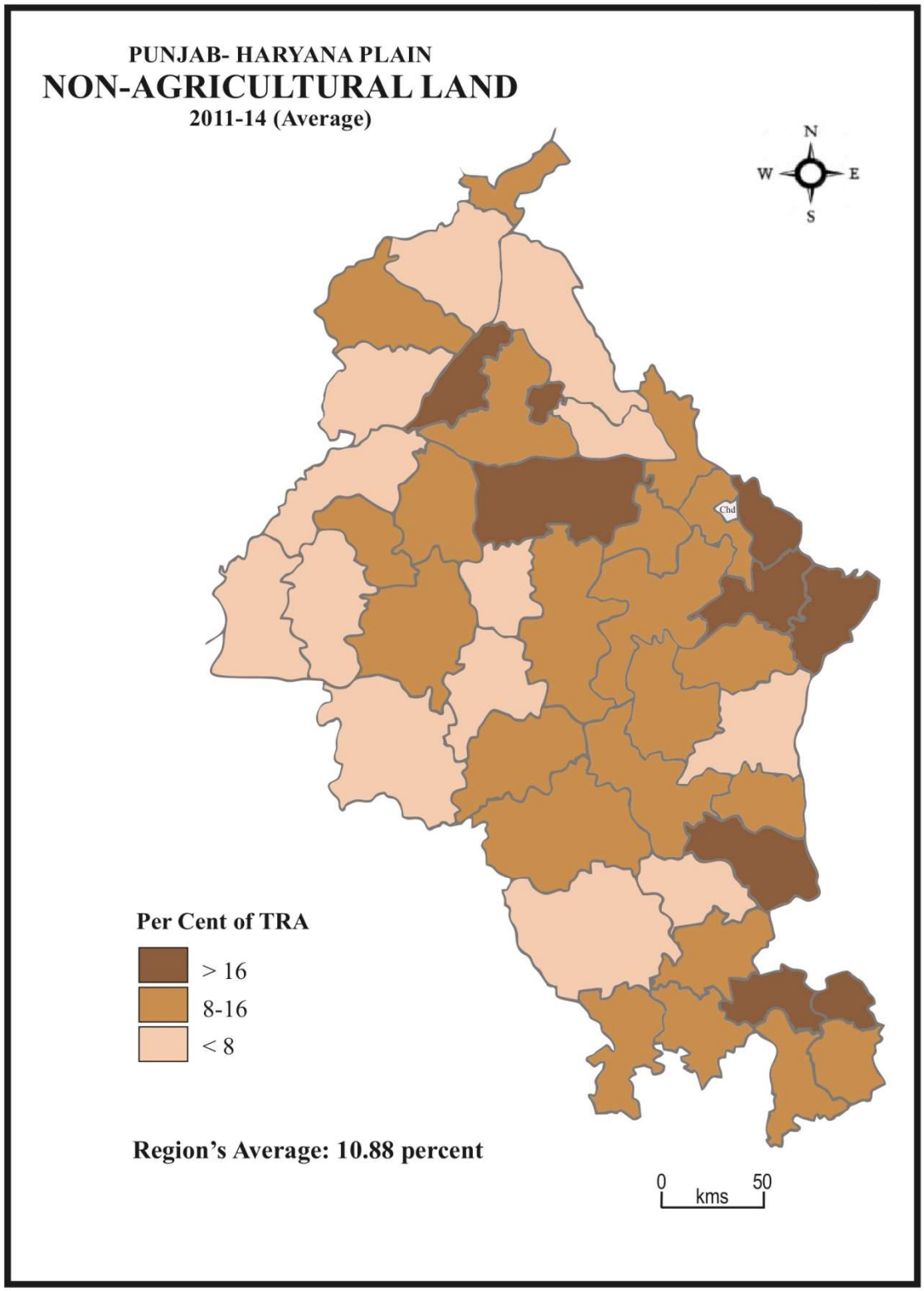
Table No. 3
Non-Agricultural in Punjab-Haryana Plain: 2011-14

Sr. No.	Districts	Per Cent of TRA
1	Gurdaspur	5.58
2	Pathankot	12.32
3	Amritsar	14.29
4	Tarn Taran	7.48
5	Kapurthala	18.71
6	Jalandhar	9.14
7	S.B.S. Nagar	7.11
8	Hoshiarpur	6.58
9	Rupnagar	11.46
10	S.A.S. Nagar	13.30
11	Ludhiana	16.03
12	Firozpur	4.04
13	Fazilka	7.46
14	Faridkot	11.11
15	Shri Muktsar Sahib	5.81
16	Moga	10.30
17	Bathinda	10.39

Sr. No.	Districts	Per Cent of TRA
18	Mansa	6.12
19	Sangrur	12.28
20	Barnala	6.64
21	Patiala	11.89
22	Fatehgarh Sahib	10.43
23	Ambala	25.97
24	Panchkula	27.84
25	Yamunanagar	16.63
26	Kurukshetra	9.90
27	Kaithal	11.13
28	Karnal	6.23
29	Panipat	13.85
30	Sonipat	20.25
31	Rohtak	7.77
32	Jhajjar	8.52
33	Faridabad	52.78
34	Palwal	8.82
35	Gurgaon	28.77
36	Mewat	12.61
37	Rewari	9.27
38	Mahendragarh	14.63
39	Bhiwani	5.81
40	Jind	11.34
41	Hisar	10.63
42	Fatehabad	9.49
43	Sirsa	5.39
	Region	**10.88**

Source: Lal Kitabs of Punjab and Haryana, 2011 to 2014

Fig. 4



Source: District-wise Lal Kitabs of Punjab and Haryana: 2011-2014

b. Areas with Moderate Share (8-16 per cent)

51.16 per cent of the total occurrences fall under moderate category which includes 22 districts namely Mahendragarh, Amritsar, Panipat, S.A.S. Nagar, Mewat, Pathankot, Sangrur, Patiala, Rupnagar, Jind, Kaithal, Faridkot, Hisar, Fatehgarh Sahib, Bathinda, Moga, Kurukshetra, Fatehabad, Rewari, Jalandhar, Palwal and Jhajjar and its percentage varies from 8.52 per cent in Jhajjar district to 14.63 per cent in Mahendragarh district. These districts are of secondary importance to industries, urbanization, developed infrastructure etc. Thus moderate level of industrialization; moderate urbanization, etc. are responsible factors for moderate share of non-agricultural land in this category.

c. Areas with Low Share (<8 per cent)

Districts of Rohtak, Taran Tarn, Fazilka, S.B.S. Nagar, Barnala, Hoshiarpur, Karnal, Mansa, Bhiwani, Shri Muktsar Sahib, Gurdaspur, Sirsa and Firozpur form low category of non-agricultural land. Here percent share is recorded lowest of 4.04 per cent in Firozpur district and highest of 7.77 per cent in Rohtak district. These areas generally have fewer urban centers, underdeveloped infrastructure and limited industries. As a result, the percentage of non-agricultural land is noted low in these districts. Additionally, these areas are socio-economically less developed areas than other regions in study area.

4. Cultivable Waste Land (Fig. 5)

Cultivable wasteland denotes land considered as cultivable but actually not cultivated on account of physical, agronomic, socio-economic and demographic constraints. Singh (1974) stated that cultivable wasteland comprises land not cultivated up to last five years or more in succession, but these are important for future expansion in cultivation. Singh and Singh (1970) define cultivable wasteland as the potential land which can be brought under plough after reclamation. According to Singh and Chandel (1998) higher is the percentage of cultivable wastelands, greater is the scope of extension of cultivated area. Out of total reporting area of 94, 00,000 hectares, an area of 27,670 hectares has been recorded as cultivable wasteland which constitutes 0.29 per cent of total reporting area in Punjab-Haryana Plain in 2011-14. But this proportion varies from 0.17 per cent in Mahendragarh district to 7.74 per cent in Panchkula district. The detail on cultivable wasteland is given in table no. 4 while fig. 5 shows spatial variations in cultivable waste land in the study region which is grouped into three categories for the explanation purpose. These categories are discussed below-

a. Category with High Cultivable Wasteland (>1 per cent)

Pathankot district of Punjab and four districts of Haryana namely Panchkula, Jhajjar, Rohtak and Rewari form high category of cultivable wasteland which accounts for 21.58 per cent of total reporting area of Punjab-Haryana Plains. Reasons for high category of cultivable waste land are undulating and dissected topography, water erosion etc. in Pathankot and Panchkula districts and offshoots of Aravallis in Rewari district while saline and alkaline soils in Rohtak and Jhajjar districts. These lands can be reclaimed with modern technology for future use in agriculture.

Table No. 4
Cultivable Wasteland in Punjab-Haryana Plain: 2011-14

Sr. No.	Districts	Per Cent of TRA
1	Gurdaspur	0.00
2	Pathankot	1.45
3	Amritsar	0.00
4	Tarn Taran	0.00
5	Kapurthala	0.00
6	Jalandhar	0.00
7	S.B.S. Nagar	0.00
8	Hoshiarpur	0.00
9	Rupnagar	0.48
10	S.A.S. Nagar	0.00
11	Ludhiana	0.00
12	Firozpur	0.00
13	Fazilka	0.00
14	Faridkot	0.00
15	Shri Muktsar Sahib	0.76
16	Moga	0.00
17	Bathinda	0.00
18	Mansa	0.00
19	Sangrur	0.00
20	Barnala	0.00
21	Patiala	0.00
22	Fatehgarh Sahib	0.00
23	Ambala	0.00
24	Panchkula	7.95
25	Yamunanagar	0.00
26	Kurukshetra	0.00
27	Kaithal	0.00
28	Karnal	0.41
29	Panipat	0.77
30	Sonipat	0.47
31	Rohtak	3.78
32	Jhajjar	3.13
33	Faridabad	0.00
34	Palwal	0.00

Sr. No.	Districts	Per Cent of TRA
35	Gurgaon	0.00
36	Mewat	0.00
37	Rewari	2.21
38	Mahendragarh	0.17
39	Bhiwani	0.00
40	Jind	0.00
41	Hisar	0.00
42	Fatehabad	0.00
43	Sirsa	0.00
	Region	**0.29**

Source: Lal Kitabs of Punjab and Haryana, 2011 to 2014

b. Category with Low Cultivable Wasteland (< 1 per cent)

This category has 6 districts and 13.95 per cent of the total occurrences. Districts fall in this category are Panipat, Shri Muktsar Sahib, Rupnagar, Sonipat, Karnal and Mahendragarh. The primary factor contributing to low category of cultivable wasteland in these areas is the presence of Shivaliks and Kandi terrain in Ropar district, waterlogging along the Yamuna River in Karnal, Panipat and Sonipat districts, offshoots of Aravallis in Mahendragarh district, and an emergence of water logging areas in Shri Muktsar Sahib District.

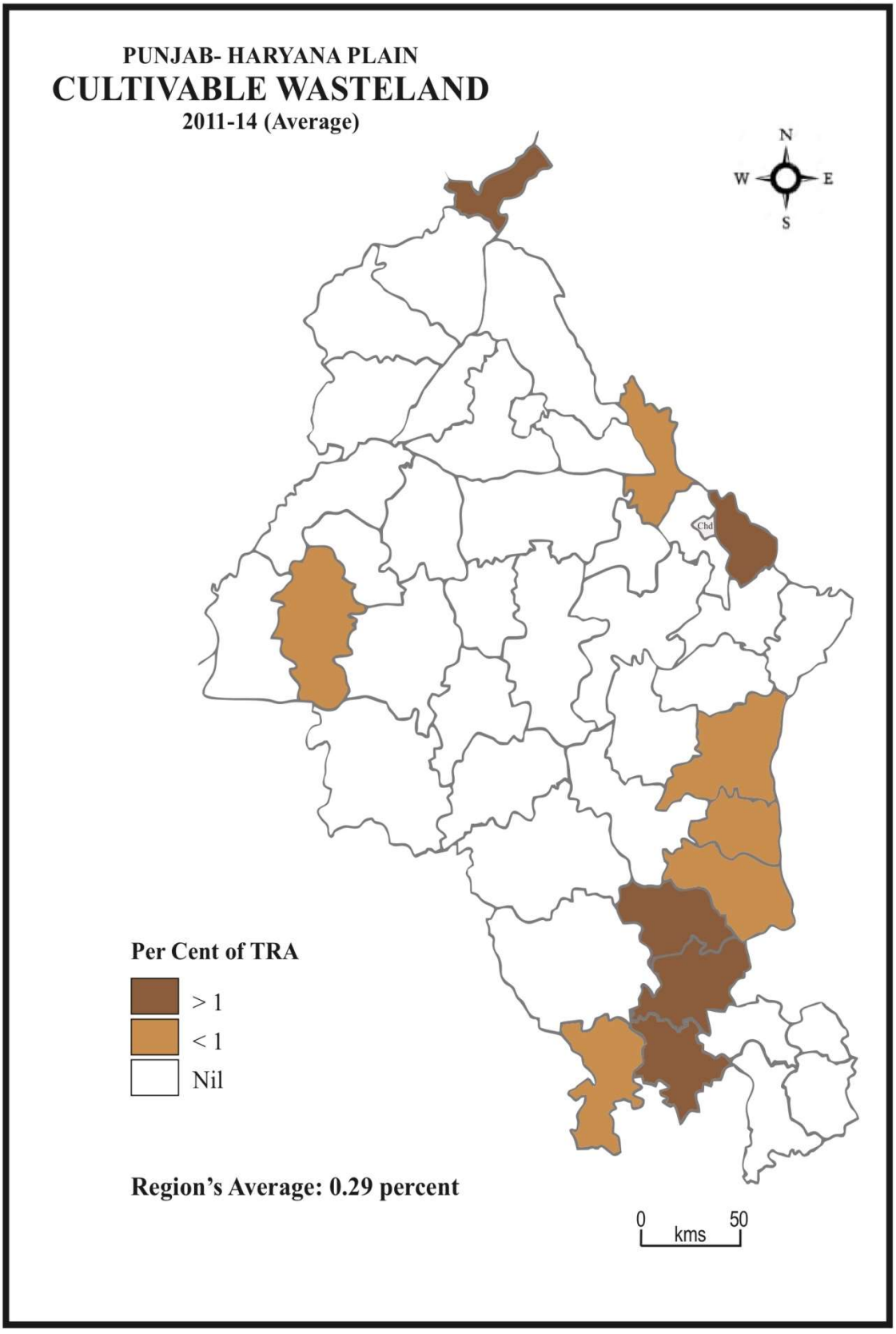
c. Category with No Cultivable Waste Land

It holds significant importance as it comprises of thirty-two districts that together account for 74.41 per cent of the total occurrences. These districts are Gurdaspur, Amritsar, Tarn Taran, Kapurthala, Jalandhar, S.B.S. Nagar, Hoshiarpur, S.A.S. Nagar, Ludhiana, Firozpur, Fazilka, Faridkot, Moga, Bathinda, Mansa, Sangrur, Barnala, Patiala, Fatehgarh Sahib, Ambala, Yamunanagar, Kurukshetra, Kaithal, Faridabad, Palwal, Gurgaon, Mewat, Bhiwani, Jind, Hisar, Fatehabad and Sirsa. All these districts have moderate to developed agricultural infrastructure followed by no scope for further reclamation of cultivable waste area. As a result no area is available under this category.

5. Current Fallow and Fallow Land (Fig. 6)

Current Fallow Land means the lands left unsown during current agricultural year to regain fertility or some other reasons. While Fallow lands are those which are not cultivated from 1 to 4 years owing to physical and human reasons but are suitable for cultivation. Total area under current fallow and fallow land is 18600 hectares which consists of 1.98 per cent of total reporting area in the study region. It varies from 0.00 per cent to as high as of 13.07 per cent in Panchkula district. In order to explain the distributional pattern of these lands in the study region, fig. 6 is mapped which depicts following four categories and these are explained below-

Fig. 5



Source: District-wise Lal Kitabs of Punjab and Haryana: 2011-2014

a. Category of High Share (>5 per cent)

This category is well scattered in 8 districts of the study region covering two districts of Punjab namely Pathankot and Shri Muktsar Sahib and six districts of Haryana namely Panchkula, Panipat, Hisar, Bhiwani, Palwal and Jhajjar. High per cent share of these lands in Panchkula and Pathankot districts is due to difficult terrain, water erosion, high rainfall etc. In Panipat district, flood plains are the major cause whereas Bhiwani, Hisar and Palwal districts consist of sand dunes on the western flanks of Aravalli ranges. Reasons for high category are high share of forest land, barren land, miscellaneous tree crops, cultivable waste land, uneconomical returns from agriculture, inadequate supply of water, erratic monsoon, lack of agricultural extension services, surface run-off, water-logging, labor scarcity etc.

Table No. 5

Current Fallow & Fallow Land in Punjab-Haryana Plain: 2011-14

Sr. No.	Districts	Per Cent of TRA
1	Gurdaspur	0.00
2	Pathankot	11.96
3	Amritsar	0.76
4	Tarn Taran	0.00
5	Kapurthala	0.00
6	Jalandhar	0.00
7	S.B.S. Nagar	1.58
8	Hoshiarpur	2.45
9	Rupnagar	0.72
10	S.A.S. Nagar	0.83
11	Ludhiana	0.00
12	Firozpur	0.28
13	Fazilka	0.23
14	Faridkot	0.45
15	Shri Muktsar Sahib	5.05
16	Moga	0.60
17	Bathinda	0.00
18	Mansa	3.61
19	Sangrur	0.18
20	Barnala	0.00
21	Patiala	1.45
22	Fatehgarh Sahib	0.00
23	Ambala	0.22
24	Panchkula	13.07
25	Yamunanagar	0.00

Sr. No.	Districts	Per Cent of TRA
26	Kurukshetra	0.00
27	Kaithal	0.00
28	Karnal	4.20
29	Panipat	5.64
30	Sonipat	0.00
31	Rohtak	2.99
32	Jhajjar	12.52
33	Faridabad	1.39
34	Palwal	5.15
35	Gurgaon	0.00
36	Mewat	3.15
37	Rewari	0.44
38	Mahendragarh	1.20
39	Bhiwani	5.24
40	Jind	1.31
41	Hisar	5.44
42	Fatehabad	0.40
43	Sirsa	2.27
	Region	**1.98**

Source: Lal Kitabs of Punjab and Haryana, 2011 to 2014

b. Category of Moderate Share (1-5 per cent)

There are 11 districts in this category namely Karnal, Mansa, Mewat, Rohtak, Hoshiarpur, Sirsa, S.B.S Nagar, Patiala, Faridabad, Jind and Mahendragarh. Moderate share of current fallow land and fallow land was owing to low rainfall, inadequate irrigation facilities and water logging in some areas

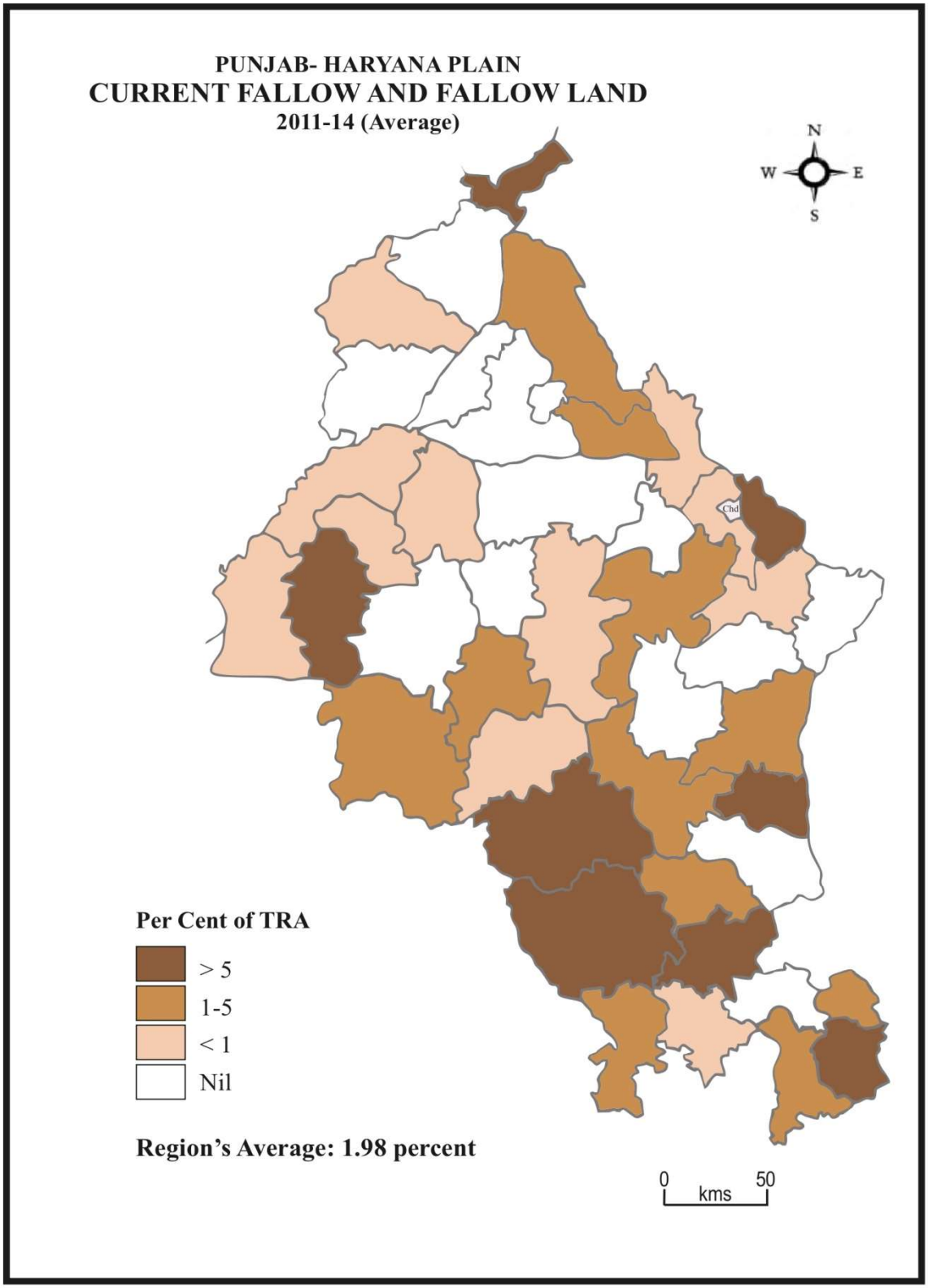
c. Category of Low Share (<1 per cent)

11 districts form this category such as S.A.S Nagar, Amritsar, Roopnagar, Moga, Faridkot, Rewari, Fatehabad, Firozpur, Fazilka, Ambala and Sangrur. Here share is less than 1.00 per cent of current fallow and fallow land. It is very insignificant and is largely owing to either sometimes excessive rainfall or drought conditions at the time of sowing. Knowledge of reclamation of waste land and high share of net sown area are important factors for low share of current fallow and fallow land.

d. Category with No Share

Total 13 districts fall in this category namely Gurdaspur, Tarn Taran, Kapurthala, Jalandhar, Ludhiana, Bathinda, Barnala, Fatehgarh Sahib, Yamunanagar, Kurukshetra, Kaithal, Sonipat, and Gurgaon districts. In all these districts, well developed agricultural infrastructure enables the farmers to sow each and every inch of cultivated land which leads to no current fallow and fallow land.

Fig. 6



Source: District-wise Lal Kitabs of Punjab and Haryana: 2011-2014

6. Net Sown Area (Fig. 7)

Area which is sown atleast once in one agricultural year is known as net sown area. The higher the proportion of net sown area to total reporting area, higher is the agricultural production (Malik, 2012). It may be referred to as net cropped area also. In Punjab-Haryana Plains, 76, 51,330 hectares are recorded under net sown area in 2011-2014 which accounts for 81.40 per cent of total reporting area. But the proportion of net sown area is not uniformly distributed in all districts of the study region. It is calculated lowest in Panchkula district i.e. 39.22 per cent and highest in Sirsa district i.e. 92.11 per cent and is shown in fig. 7 and table no. 6 which shows the following three categories:

a. High Share of Net Sown Area (>85 per cent)

This category has one belt and one patch. The belt includes 17 districts namely Sirsa, Tarn Taran, Firozpur, Mansa, Fatehabad, Kurukshetra, Bathinda, Fatehgarh Sahib, Jalandhar, Barnala, Fazilka, Moga, Kaithal, Faridkot, Sangrur, Shri Muktsar Sahib and Jind. The main reasons for high proportion of net sown area in the belt are leveled lands, old agricultural colonized areas, high extent of irrigation, low share under forest land, highly mechanized farming etc. The patch of this category has only Gurdaspur district, sharing similar reasons for high proportion of net sown area as in the case of the belt.

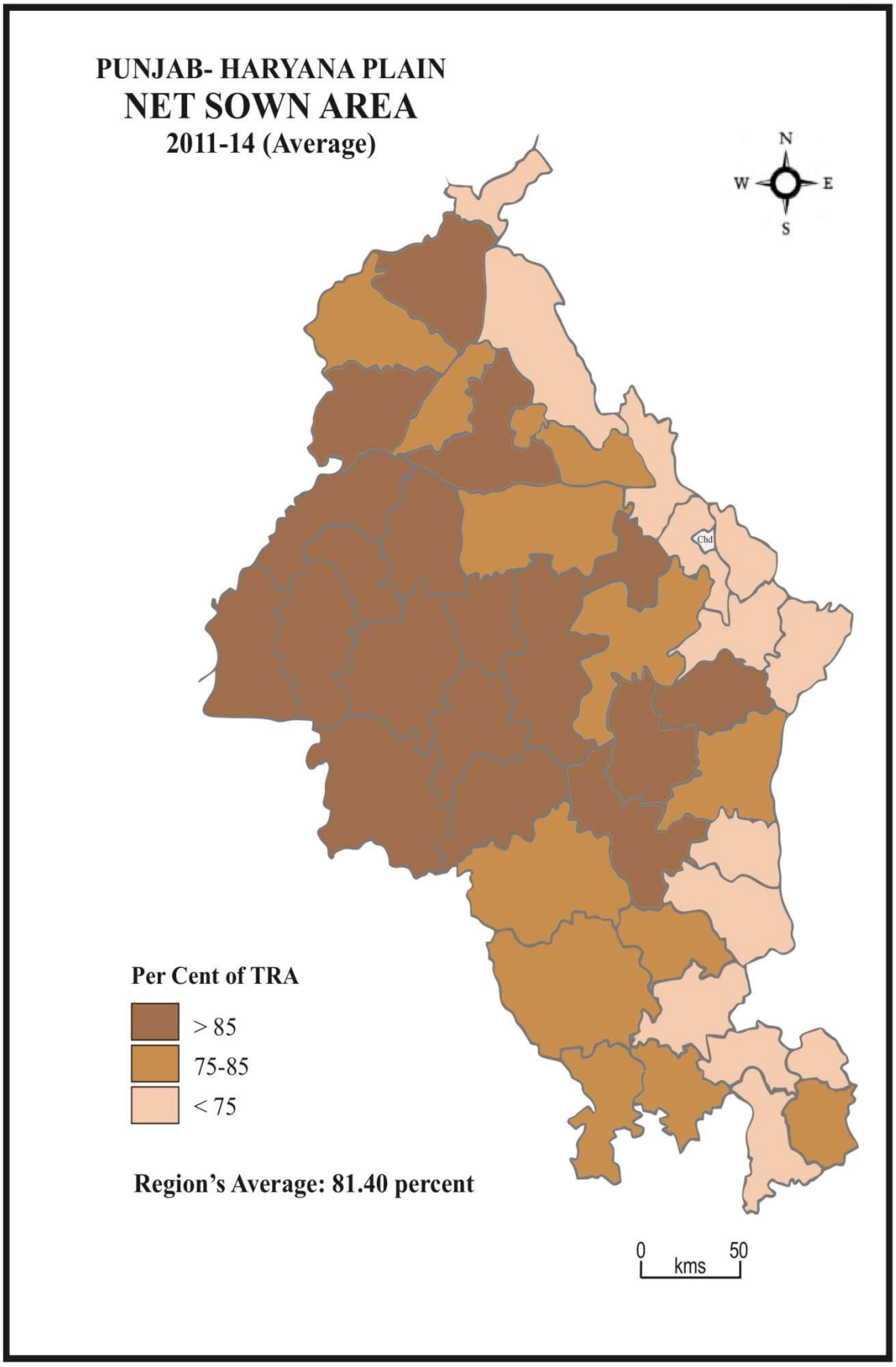
Table No. 6
Net Sown Area in Punjab-Haryana Plain: 2011-14

Sr. No.	Districts	Per Cent of TRA
1	Gurdaspur	88.07
2	Pathankot	52.17
3	Amritsar	82.93
4	Tarn Taran	90.44
5	Kapurthala	80.48
6	Jalandhar	88.61
7	S.B.S. Nagar	78.16
8	Hoshiarpur	58.98
9	Rupnagar	57.52
10	S.A.S. Nagar	63.99
11	Ludhiana	81.25
12	Firozpur	90.38
13	Fazilka	88.11
14	Faridkot	87.07
15	Shri Muktsar Sahib	86.11
16	Moga	87.61
17	Bathinda	88.82
18	Mansa	89.32

Sr. No.	Districts	Per Cent of TRA
19	Sangrur	86.80
20	Barnala	88.39
21	Patiala	80.66
22	Fatehgarh Sahib	88.70
23	Ambala	69.91
24	Panchkula	40.34
25	Yamunanagar	72.15
26	Kurukshetra	88.91
27	Kaithal	87.26
28	Karnal	78.59
29	Panipat	73.08
30	Sonipat	74.10
31	Rohtak	82.07
32	Jhajjar	71.83
33	Faridabad	43.06
34	Palwal	78.92
35	Gurgaon	67.88
36	Mewat	73.65
37	Rewari	83.22
38	Mahendragarh	78.83
39	Bhiwani	83.92
40	Jind	85.44
41	Hisar	82.21
42	Fatehabad	89.30
43	Sirsa	92.11
	Region	**81.40**

Source: Lal Kitabs of Punjab and Haryana, 2011 to 2014

Fig. 7



Source: District-wise Lal Kitabs of Punjab and Haryana: 2011-2014

b. Moderate Share of Net Sown Area (75-85 per cent)

The districts such as Bhiwani, Rewari, Amritsar, Hisar, Rohtak, Ludhiana, Patiala, Kapurthala, Palwal, Mahendragarh, Karnal and S.B.S. Nagar form the category of moderate share of net sown area. Reasons identified for moderate proportion are urbanization, industrialization, negligible current fallow and fallow land etc. Owing to these reasons, this category has experienced moderate share of net sown area.

c. Low Share of Net Sown Area (<75 per cent)

Low category of net sown area is divided into two belts. First belt is spotted near borders of Himachal Pradesh and Jammu & Kashmir which includes 7 districts namely Pathankot, Hoshiarpur, Roopnagar, S.A.S Nagar, Panchkula, Ambala and Yamunanagar with 16.28 per cent of total occurrences. The belt is composed of low shiwalik hills and piedmont plains, sub-mountainous undulating and dissecting plains, seasonal torrents, high share of forest and barren land, comparatively less developed agricultural infrastructure, low to moderate extent of irrigation etc. The second belt comprises of 6 districts namely Panipat, Sonipat, Jhajjar, Gurgaon, Faridabad and Mewat which are located close to National Capital Region of Delhi and has 13.95 per cent of total occurrences. High share of non-agricultural land owing to high urbanization, industrialization, developed infrastructure etc. are responsible for low share of net sown area in second belt.

7. Others

Other category includes land under pastures & grazing lands and miscellaneous tree crops which are having 0.33 per cent and 0.15 per cent of total reporting area in the study area respectively.

Conclusion

The study has deduced that districts with unfavorable physical environment like hills, undulating and dissected topography have high per cent area under forest land because in such areas successful crop farming is not feasible. While districts with flat topography, fertile soil and developed agricultural infrastructure are having either no forest land or low per cent share under forest land. In rest of the districts, the share of forest land is noted moderate. In respect of barren land, it is found that districts with problems like mountains, hills, undulating topography, deserts etc. have moderate to high share of barren land. But areas having minor problems or free from any physical problem have either negligible share or no area under barren lands. Non-agricultural land has high share in districts with large number of industries, high magnitude of urbanization, commercialization, infrastructural development etc. While areas with poor urbanization, less developed infrastructure, low degree of industrialization, etc. have low per cent area under it. The study has also concluded that districts having shiwaliks or piedmont plains or water-logging areas along rivers or kallar soils etc. have either high or moderate proportion of cultivable waste land, whereas districts having flat plains and developed agricultural infrastructure are marked with no cultivable wasteland. It is noted that proportion of current fallow and fallow land is moderate to high in areas which are subjected to seasonal floods or lands under salinity and alkalinity, less developed agricultural infrastructure etc. But more than 50 per cent of total districts in the study region have either negligible or no current fallow or fallow land. Districts with low urbanization, low industrialization, comparatively highly developed agricultural infrastructure, high extent of irrigation, etc. are blessed with high

share of net sown area. While areas with high share of forest land, barren land, cultivable wasteland or areas marked with developed infrastructure, high magnitude of urbanization & industrialization, low to moderate extent of irrigation etc. have registered low share of net sown area.

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