

Research Article



Impact of Built Environment on Land use of Rapidly Growing Tehsil Takht Bhai, District Mardan

Sajjad Ali¹, Atta-ur-Rahman¹ and Sher Ali^{2*}

¹Department of Geography, University of Peshawar, Khyber Pakhtunkhwa, Pakistan; ²Department of Economics, Islamia College, Peshawar, Khyber Pakhtunkhwa, Pakistan

Abstract | This study is an attempt to find out the impact of built environment on land use of tehsil Takht Bhai, Khyber Pakhtunkhwa, for the period of 1985-2015. Spatial techniques like Geographic information system and remote sensing are used to detect land use changes. This study is carried out at three levels; initially the whole tehsil is studied for land use change analysis by comparing 1985 and 2015 Landsat images. Secondly, four sample union councils were targeted for medium level analysis. Thirdly, seven sample villages are targeted for micro level. The Landsat images of 1985 and 2015 are obtained from the open source Global Land Cover Facility (GLCF). The analysis revealed that the cultivated area was 146 square kilometer in 1985. It was observed that the cultivated area in the tehsil is reduced to 91 square kilometer, by losing 55 square kilometer area from 1986 to 2015, with a rate of 1.6 square kilometer area per year. If this process of land utilization for infrastructure instead of farming remains at the same speed till 2055, there will be no agricultural land in the tehsil for farming. Population increase is the main cause of such firm land loss. Statistical technique like central tendencies, dispersion and co-efficient of correlation were applied on population, area under built-up environment, cultivated area and crop production in the study area. During the study period from 1985-2015, rapid physical expansion is reported in the study area and strong correlation was observed between population growth and environmental built.

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***Correspondence** | Sher Ali, Department of Economics, Islamia College, Peshawar, Khyber Pakhtunkhwa, Pakistan; **Email:** drali@icp.edu.pk

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Introduction

To investigate land use land cover, change this study is divided in to three sections. In section one the entire tehsil is studied for land use land cover change in 1985 and 2015 (Macro level analysis). The second section of this study deals land use land cover change in sample union councils randomly selected namely Sher Garh, Kot Jungarah, Maddey Baba and Saro Shah for land use land cover change (Medium level analysis). The last section is on the land use land cover change in sample villages selected namely

Shabat Khel, Saro Shah, Chail, Ahmad Abad, Lund Khwar, Qutab Garh and Parkho Deri studied villages (Micro level analysis). Expansion in built environment is the development of new constructions to cater the needs of increasing population (Rahman et al., 2016). This increase in built environment may take place on fertile cultivated land or barren land (Yar et al., 2016). Similarly, with the passage of time this new development, gradually change the existing land use pattern and increase pressure on the land to fulfill the need of ever increasing population (Kandrika and Roy, 2008; Rahman, 2012). To gratify the residential

requirements of rising population ecologically fertile cultivated land has brought under built environment (Zhong et al., 2007). This brought changes in land use pattern and further increase stress on cultivated land to provide sufficient food to the increasing inhabitants (Rahman and Khan, 2006). This permanent increase in infrastructure has badly effects the quality of air, soil and water in the world (Hubacek and Vazquez, 2002). Such development marks the consumption of prime agricultural land near the existing settlements of the globe. In the same way expansion in built-up area is considered the main feature for land use dynamics throughout the world. Pakistan is an agro-based country, where farming is considered the back bone of the state economy, also majority of the inhabitants were engaged in farming sector (Khan and Gul, 2013). In Pakistan the transformation of cultivated land to built-up area is the major challenge of 21st century. The expansion in built-up area is attributed to rapid population growth rate in the country, has not only reduced the production but also snatch the farming occupation from most of the farmers (Hellerstein et al., 2002). Globally increase in per capita earnings and rapid population growth rate has attributed to multiplication in built-up area (Bhatt et al., 2014). The increase in earnings compel a man to be the owner of more and more land and houses, and in this way prime agricultural land converted to built-up area (Cheng and Masser, 2003). Similarly, With the increase in population fertile cultivated land were converted to new houses and other infrastructure to cope the needs of such population. This expansion has attributed to decline productive cultivated land around nearby settlements of third world countries (Rahman, 2006). Worldwide, the population will be increased about three times, and the population of urban centers will be increased two times by 2030, and this expansion may be resulted at cost of prime cultivated land (Schewenius et al., 2014). Therefore, it is dire need of the hour to spatially monitor the land use pattern and promote expansion in built-up environment sustainably (Galor and Weil, 1999). Whereas in developed countries such as Taiwan, Japan, South Korea and Singapore the loss of cultivated land was attributed to industrialization and physical expansion (Heimlich, 1989). The same developed countries lost enough cultivated land that his status has been changed from grain donor to grain importer due to over population in their countries (Brown and Kane, 1995). Similarly, in less developed countries Bangladesh is the country where cultivated land is

losing very rapidly as compared to other regions of the world due to increase in urban population, and the farmland is unable to provide reasonable food to cater the demand of growing population (Sala and Bocchi, 2014). Globally, 0.3 percent of the total arable land was occupied by urban centers in 2000 (Hubacek and Vazquez, 2002). Therefore, it is dire need of time to spatially monitor land use changes and to develop effective land use policies for new development and to control existing land use to prevent further farmland conversion (Kanada and Irham, 1998). Land use dynamics is the procedure to find out spatial and temporal changes in land utilization (Khan, 1991). In developing countries land is intensively utilized for agriculture to enhance production, in order to satisfy the food demand of rapid population expansion (Sudhaira et al., 2004). Furthermore, the recent changes in land use pattern especially expansion in built-up environment is extraordinary than reported ever-before (Han et al., 2008). In Pakistan the land use pattern is consistently changing, especially the cultivated area is engulfing by built-up area rapidly (Khan and Gul, 2013). The Pakistani economy is mainly dependent upon farming, while there is a tough competition among cultivated land and expansion in built-up environment (Samiullah, 2013). Excessive increase in population growth, miss-use of land and no specific public policy regarding building and infrastructure in developing countries (Ali et al., 2013). It can be restricted with the efficient use of public policy and low population growth rate. Agricultural land can be prevented with intervention of public sector. It is reported that the root causes and consequences of land use conflicts, by indicating as to how land use decisions for infrastructural settings have changed rural economy (Magsi et al., 2017; Addae and Oppelt, 2019).

Land use planning is one of the effective ways of achieving overall sustainable physical development especially, in urban areas (Dambiebo and Jalloh, 2018).

Tehsil Takht Bhai is the section of District Mardan, located in northern part of Peshawar valley (Figure 1). Mardan is the second most populous district of Khyber Pakhtunkhwa, is consist of three tehsils namely, Katlang, Mardan and tehsil Takht Bhai. Tehsil Takht Bhai is the second largest and populous tehsil after Mardan and lies in the northern part of the district. Geographically, Tehsil Takht Bhai is sited among 34° 13' 13" to 34° 27' 08" North latitude

and longitudinal extent is in between $71^{\circ} 54' 59''$ to $72^{\circ} 05' 16''$ East. Tehsil Takht Bhai has total area of 414 Sq. km. Geographically, the tehsil is surrounded by District Charsadda on the west, to the east lies Tehsil Katlang, similarly to the north lies District Malakand and Tehsil Mardan is located to the south of the Takht Bhai. The population of tehsil Takht Bhai was 218,026 in 1981 with population density of 526 persons per square kilometer (GOP, 1983). This figure increased to 402,706 in the last census carried out in 1998 with the density of 972 persons per square kilometer. Further the estimated population is 664,223 in 2015 with the density of 1,604 persons per square kilometer (GoP, 2017).

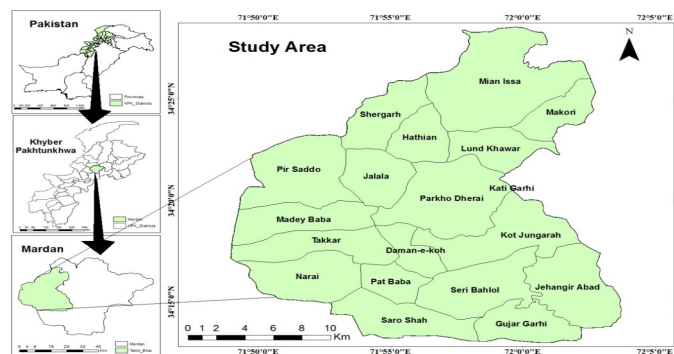


Figure 1: Location map of Tehsil Takht Bhai, District Mardan.

High population growth rate attributed to land use dynamics in the study area. The built-up area is consistently increasing in the study area in order to gratify the requirements of growing population. This expansion in built-up environment gradually shrank the agricultural land in the study region. The reduction in cultivated area in the study region resulted in the delimited the food supply to their inhabitants. As tehsil Takht Bhai has fertile agricultural land being converted into built-up environment, not only reduced the production of crops but also increasing inflation rate in the area. It is cleared that Pakistan is one of those country whose economy directly depends upon in agriculture. The population of the country mostly involved in agricultural sector. The share of farming sector is 20 percent to the gross domestic products. This fertile land is continuously consumed by built-up area in the country and in tehsil Takht Bhai as well. This reduction in cultivated land led to land use change in tehsil Takht Bhai. Therefore, the present study is an effort to discovery the impact of expansion of built environment built environment on land use change in Tehsil Takht Bhai.

Tehsil Bhai is selected for many reasons; it is the

most growing tehsil of district Mardan in respect of population increase and built environment. It has been lost a hug part of its agricultural land use due to continuous and persistently built environment over the last few decades. During 1985-2015, about 55-square kilometer area under cultivation is used for infrastructure. If this tehsil grows at the same rate of built environment no land will be available in the next few decades. This is alarming which should to be discussed at a greater length to disclose the importance of cultivated land for survival of the mankind.

Therefore, this study aimed to examine the impact of Built environment on farmland in tehsil Takht Bhai.

Materials and Methods

Data collection

The data were obtained from both primary and secondary sources. The primary data was obtained by using questionnaire survey. Similarly, two questionnaires (for individuals and institutions) have been designed. The questionnaires designed for institution such as Patwaris, were filled from concerned patwar in each mouza about cultivated and uncultivated land in their respective mouza, in such a way the whole tehsil were studied. Those sample villages were selected in which radical changes in cultivated and uncultivated area has been observed during the study period. Similarly, individual questionnaire was designed for each selected village in order to get a clear picture of land use transformation and land use land cover change in 1985 and 2015. In the same way in sample selected union councils 200 questionnaires were filled in sample union councils, 50 were filled in each union council to find out land use land cover change and land values. The data obtained were analyzed in the form of maps and statistical diagrams in 1985 and 2015, in order to get a clear view in land use dynamics in the form of cultivated and uncultivated area in tehsil Takht Bhai. Similarly focused group discussion was conducted to find out the causes of rapid expansion on farmland in tehsil Takht Bhai with the revenue officials and elder of the community.

Secondary data collected from the office of SUPARCO, Peshawar, and Population Census Organization Peshawar. Landsat imageries for the year 1985, and 2015 were obtained from open source Global Land Cover Facility. The satellite imageries

obtained, were processed through ArcMap in order to detect spatial and temporal land use changes in tehsil Takht Bhai during the last thirty years. Similarly, the map of tehsil Takht Bhai acquired from district census report Mardan.

Data analysis techniques

The data collected in the form of maps and data are presented in the form of statistical diagrams. Geographical Information Systems (GIS) is used for images. The satellite imageries obtained was process and classified supervised and unsupervised to detect land use change through Arc. Map. Finally, the analyzed data were presented in the form of maps, statistical diagrams and tables.

Results and Discussion

Tehsil Takht Bhai land, cover change (Macro level analysis)

The total area of the tehsil Takht Bhai is 414 Square kilometers. Out of the total, the cultivated land in tehsil Takht Bhai was 50,027 acres in 1985. With the passage of time cultivated area in Tehsil Takht Bhai was decreasing and in 2015, the area reduced to 41,357 acres. The production from this cultivated land reported was 561,259 tons in 1985, which was reduced to 503,508 tons in 2015. In this way in tehsil Takht Bhai 57,751 tons of production is decreased during the study period from 1985 to 2015. The uncultivated land reported was 35,110 acres in 1985. This uncultivated land has increased to 43,780 acres in 2015. The increase in uncultivated area is attributed to high population growth rate and increasing land values in the study area. In this way 8,670 acres of cultivated land has been lost in the last thirty years, with the rate of 346 acres per year in tehsil Takht Bhai. If the loss in cultivated land remains in such a speed, then up to the end of 2055 there will be no land for agriculture in tehsil Takht Bhai.

The analysis revealed that in the tehsil Takht Bhai the largest area of 157 square kilometers was occupied by Barren Land (cultivable waste) in 1985 (Table 1). This indicates that due to low income and limited population in tehsil, the largest area was under cultivable waste land (Figure 2). The analysis further revealed that the area under agriculture was 146 square kilometers to the total area of the tehsil Takht Bhai. This indicates that the cultivated area was the second largest land use of tehsil Takht Bhai and is almost 11 square kilometers less than the barren land.

Table 1: Tehsil Takht Bhai comparison in Land Cover, 1985 and 2015.

Land Cover	Area in Sq. km 1985	Area in Sq. km 2015
Vegetation	146	91
Barren Land	157	153
Built up Area	100	156
Water Bodies	10	12

Source: Land Revenue Record, 1985 and 2015.

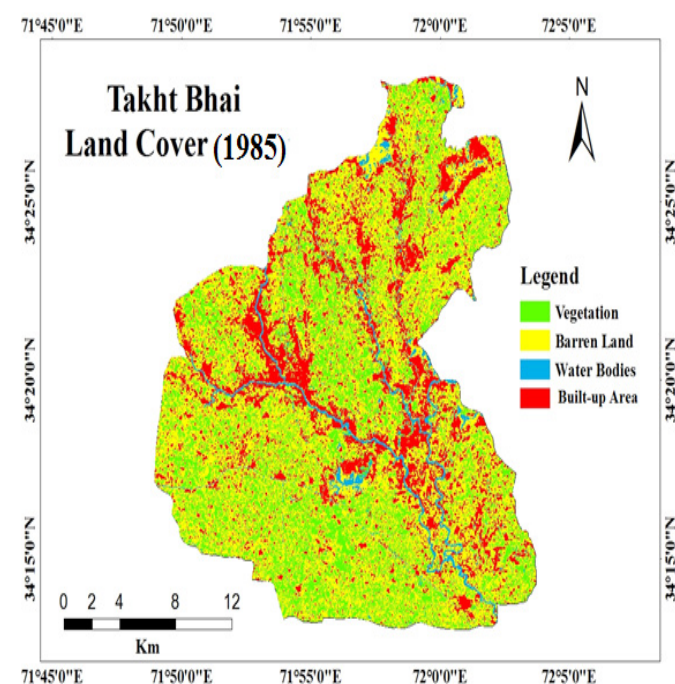


Figure 2: Tehsil Takht Bhai, Land Cover, 1985.

The analysis further showed that due to the fertile cultivated land and water availability majority of the population of the tehsil Takht Bhai was engaged in agricultural sector in 1985. Furthermore, in 1985, the built-up area was 100 square kilometers to the total land uses of the study region. This indicates that in tehsil Takht Bhai due to joint family dwelling system, the area under built-up environment was less than the cultivated land and cultivable waste land. Similarly, the land under water bodies showed the lowest share of only 10 square kilometers in the study area, which includes major streams; canals and surface water mainly used to irrigate the farmland.

Similarly, in 2015, in tehsil Takht Bhai the land cover change analysis revealed that, the largest areas of 156 Square kilometer are occupied by built-up area. This indicate that in 2015 built-up area is the major land use of tehsil Takht Bhai, the analysis revealed that an increase of 56 Square kilometer areas occurred in built up area during past thirty years (Figure 3). Similarly,

the second largest area was reported from cultivable waste land with a share of 153 Square kilometers. Furthermore, the cultivated land occupied 91 Square kilometers in 2015 in tehsil Takht Bhai. The analysis indicates that vegetation (cultivated area) shows a decreasing pattern in the study region and lost 55 Square kilometer areas during 1985 to 2015. This is cleared from land use analysis that the cultivated area is losing with the rate of 1.8 Square kilometer per year during the last thirty years. The analysis further revealed that in the study area the cultivated land is consistently consuming by built-up area. If the loss in cultivated area is continued in such acceleration, then up to 2055 there will be no land for agriculture in tehsil Takht Bhai. Besides, it is showed that loss in cultivated area is nearly equal to gain in area by built-up environment. This indicates that cultivated and cultivable waste land is constantly engulfing by built-up environment in the form of new roads, railway track, and housing unit's educational institutes and commercial center to cater the basic requirements of growing population in tehsil Takht Bhai. The analysis further revealed that the water bodies maintain its lowest position throughout the study and occupied only 12 square kilometer land in 2015. This indicates that 2 Square kilometer increase in water bodies occurred during the study period from 1985 to 2015 in tehsil Takht Bhai.

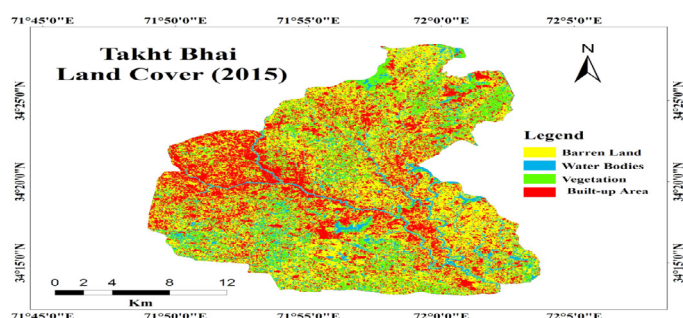


Figure 3: Tehsil Takht Bhai, Land Cover, 2015.

This is cleared from analysis of land cover dynamics that 55 Square kilometers cultivated land has been lost during last thirty years, with a rate of 2.2 Square kilometer per year in the study region (Table 2). The built-up area increased by 56 Square kilometers with a rate of 2.3 Square kilometer per year in the study area from 1985 to 2015. This indicates that the increase in built-up land in the study region is attributed to high population growth rate and escalation land value. The analysis revealed that the total population of the tehsil was 218,026 in 1981, with 526 persons per Square kilometer, which increased to 402,706

with 972 persons per Square kilometer in 1998, and estimated population in 2015 is 664,223, with 1604 persons per Square kilometer. Similarly, the cultivable waste land lost 4 Square kilometer areas during the last thirty years in tehsil Takht Bhai.

Table 2: Tehsil Takht Bhai comparison in Land Cover, 1985 and 2015.

Land Cover	Area in Sq. km 1985	Area in Sq. km 2015	Change in area in Sq.km 1985-2015
Vegetation Cover	146	91	-55
Barren Land	157	143	-4
Built up Area	100	156	+56
Water Bodies	10	12	+2

Source: Land Revenue Record, 1985 and 2015.

Land cover change in sample union councils (Medium level analysis)

In tehsil Takht Bhai four union councils were selected for land use cover change namely Sher Garh, Saro Shah, Kot Jungarah and Maddey Baba for medium level analysis in 1985 and 2015. In selected union councils the area utilizing for different purposes is shown in Square kilometer. The analysis showed that built-up area increased many folds in each sample Union Councils. This increase in built-up area attributed to land use dynamics in each selected union council. The analysis further revealed that this modification in land cover was due to population increase and increase in land values as the land values was increased many times in the selected union councils.

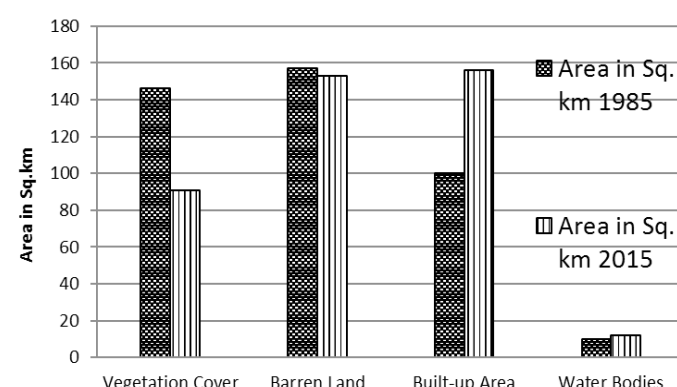


Figure 4: Tehsil Takht Bhai comparison in Land Cover, 1985 and 2015.

Moreover, the analysis showed that in Union council Saro Shah, the built-up area is increased by 14 Square kilometers, increased from 32 to 46 Square kilometer, and cultivated area lost by 14 Square kilometer during the study period (Figure 5). Similarly, in Kot

Jungarah the built-up area is enlarged from 24 to 37 Square kilometer, showing an increase of 13 Square kilometers, and cultivated land is reduced by 9 Square kilometer in last 30 years.

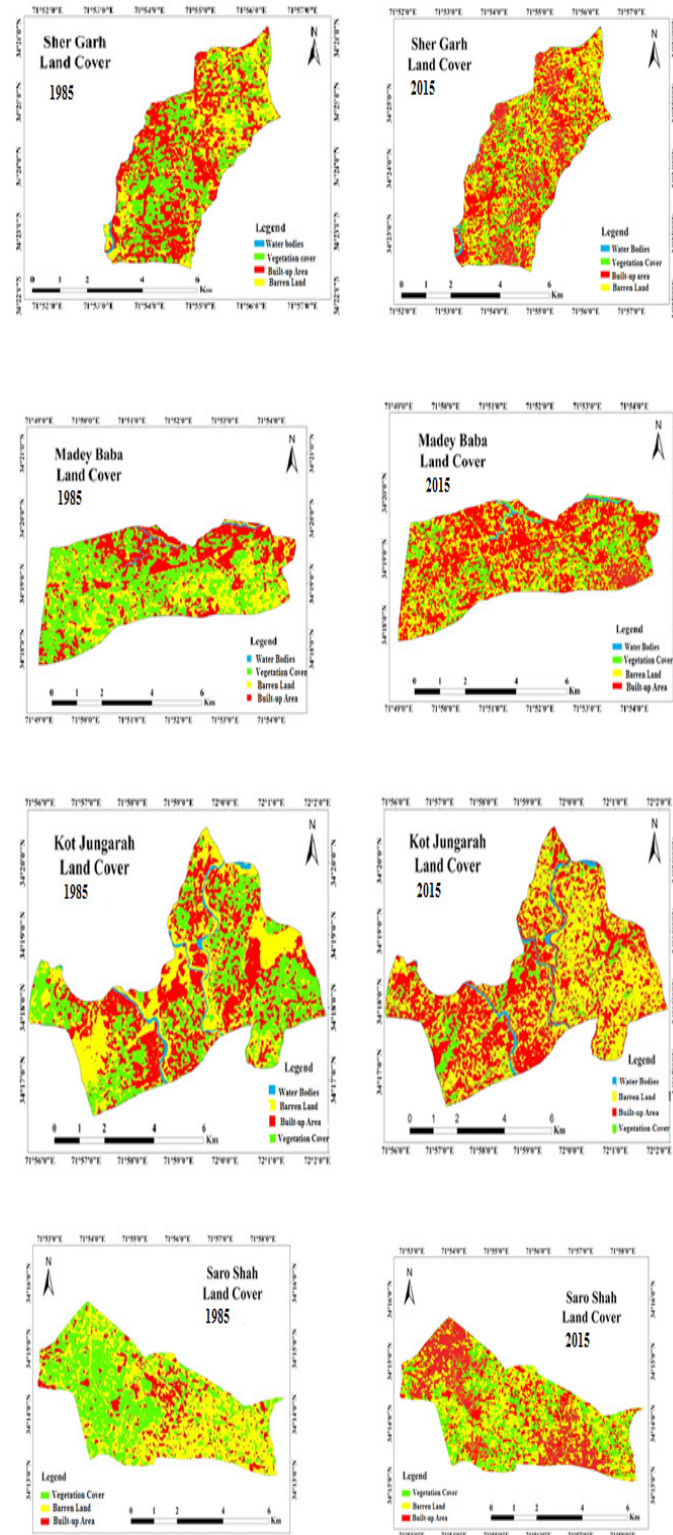


Figure 5: Sample union councils land use land cover, 1985 and 2015.

In the same way in union council Maddey Baba built-up area rises from 21 to 46 Square kilometer, showing a positive change of 25 Square kilometers, while cultivated area showed a negative change of 9 Square

kilometers during the past 30 years. Furthermore, in union council Sher Garh, the built-up land was modified from 22 to 38 Square kilometer, showing a positive change of 16 Square kilometers in built-up land use, while agricultural land showing a negative change and loss 13 Square kilometer land during study period from 1985 to 2015.

The drastic change in built-up area was found in the union Council Maddey Baba, having an increase of 25 Square kilometers from 1985 to 2015. The analysis revealed that the loss in cultivated area in each union council is equal to the gain in area by built up environment in past thirty years.

Land cover change in sample villages (Micro level analysis)

In Tehsil Takht Bhai out of 38 villages, seven were selected in which radical changes in land use was observed in last thirty years. The villages in which severe changes in cultivated land reported are Lund Khwar, Chail, Shabat Khel, Saro Shah, Qutab Garh, Ahmad Abad, Parkho Deri, Pir Abad, Kot Jungarah, Dewan Khel and Kaloo Shah. In these sample villages the land use is broadly classified in to two classes, as cultivated and uncultivated land. The analysis further revealed that loss in cultivated land severely affected the production of major crops in sample villages.

Furthermore, there are few villages in which minor change has been observed in agricultural land such as, Rahmat Abad, Nari, Takkar, Mian Killi, Pir Saddo, Shah Baig, Fateh Abad and Zarin Abad in these villages less than 300 acres of cultivated land lost from 1985 to 2015 (Figure 6). In the same way Jahangir Abad, Narai and Jalala are the villages in which less than 120 acres of farmland has been converted to other land use in past thirty years. Therefore, these villages are considered the pure agricultural village's tehsil Takht Bhai.

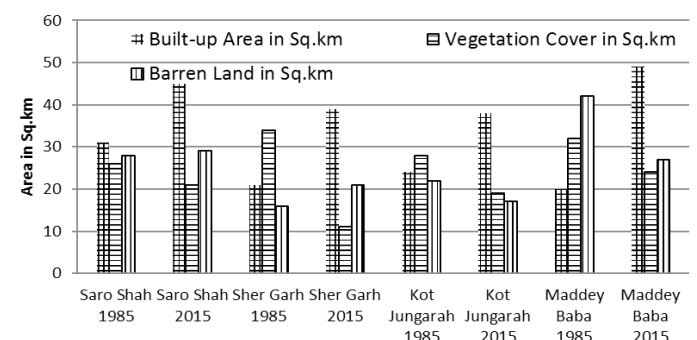


Figure 6: Sample Union Councils Comparison in Land Cover, 1985 and 2015.

The analysis revealed that the largest cultivated land was reported from Lund Khwar having 5,270 acres of cultivated area in 1985. The uncultivated area in the form of built-up area and barren land reported was 910 acres in 1985. Similarly, the second largest cultivated area was found in Shabbat Khel having 2,673 acres of cultivated land, while the uncultivated was 901 acres in 1985.

Table 3: Sample Union Councils Land Cover, 1985 and 2015.

Land cover	Built up area in Sq.km	Vegetation cover in Sq.km	Barren land in Sq.km
Saro Shah 1985	31	26	28
Saro Shah 2015	45	21	29
Sher Garh 1985	21	34	16
Sher Garh 2015	39	11	21
Kot Jungarah 1985	24	28	22
Kot Jungarah 2015	38	19	17
Maddey Baba 1985	20	32	42
Maddey Baba 2015	49	24	27

Source: Extracted from LANDSAT image 1985 and 2015.

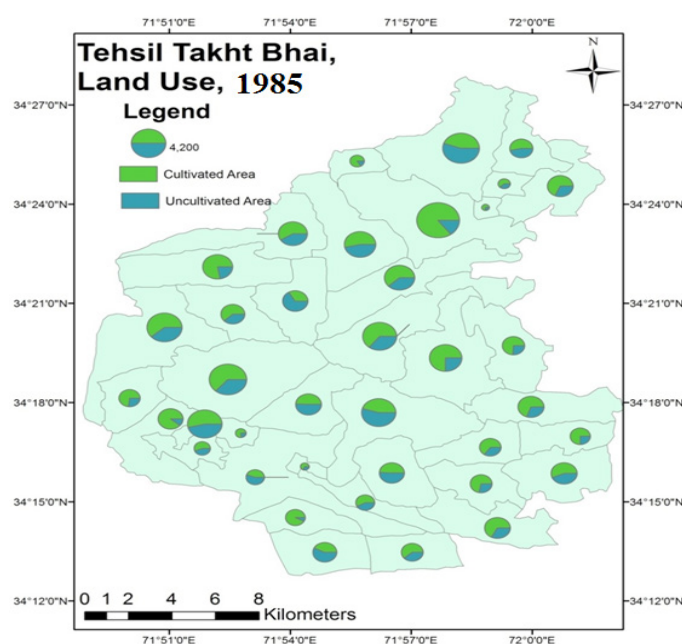


Figure 7: Tehsil Takht Bhai, All Villages' Cultivated and Uncultivated Land, 1985.

Furthermore, the villages having more cultivated land are Parkho Deri and Qutab Garh, having 2,514 and 2,331 acres of cultivated land in 1985, while from the same villages 1,390 and 666 acres of land were reported as uncultivated in 1985. The analysis revealed that the lowest cultivated area is reported from Chail and Saro Shah, having 1,489 and 1,186 acres in 1985, besides uncultivated area of the same sample villages

reported was 724 and 102 acres. Furthermore, the sample village Saro Shah has a difference of 1084 acres, in cultivated and uncultivated area in 1985. In the same way in sample village Lund Khwar the largest variation of 4360 acres found between cultivated and uncultivated land in 1985.

Table 4: Sample villages Comparison in Cultivated and Uncultivated Land, 1985–2015.

Sample Villages	Cultivated in Acres 1985	Cultivated in Acres 2015	Uncultivated in Acres 1985	Uncultivated in Acres 2015
Lund Khwar	5270	3297	910	2883
Qutab Garh	2331	1503	666	1494
Parkho Deri	2514	1594	1390	2310
Shabbat Khel	2673	1259	901	2313
Saro Shah	1196	637	102	661
Chail	1489	947	724	1266
Ahmad Abad	1855	868	230	1217

Source: Land Revenue Record, 1985 and 2015.

The analysis revealed that in sample village Lund Khwar uncultivated area was 910 acres in 1985, which increased to 2,883 acres in 2015 (Table 4). This indicates that 1,973 acres increase in uncultivated area occurred during past thirty years, with a rate of 65.7 acres gain per year. Similarly, in Qutab Garh, the uncultivated land in 1985 was 666 acres, which increased to 1,494 acres in 2015. This showed that during the study period from 1985 to 2015 the uncultivated land is increased by 828 acres, with a rate of 27.6 acres per year. In the same way in Ahmad Abad the uncultivated area recorded was 230 acres in 1985, which is increased to 1,217 acres in 2015. This indicates that during last thirty years 987 acres of uncultivated land were gained by the sample village, with a rate of 33 acres per year. In the same way the sample village Chail the lowest change in uncultivated area is reported, having the uncultivated area of 724 acres in 1985, which is increased to 1,266 acres in 2015. This selected village indicated that during the past thirty years the uncultivated area gain 542 acres of land, showing an increase of 18.6 acres uncultivated area per year in the village. The results of the present study are parallel with the findings of the past studies conducted by Hubacek and Vazquez, 2002; Zhong et al. (2007) and Rehman (2012). According to Kandrika and Roy (2008) as time passes new development, gradually change the existing land use pattern and increase pressure on the land to fulfill the need of ever increasing population. To gratify the residential

requirements of rising population ecologically fertile cultivated land has brought under built environment (Zhong et al., 2007). This brought changes in land use pattern and further increase stress on cultivated land to provide sufficient food to the increasing inhabitants (Rahman and Khan, 2006). This permanent increase in infrastructure has badly effects the quality of air, soil and water in the world (Hubacek and Vazquez, 2002).

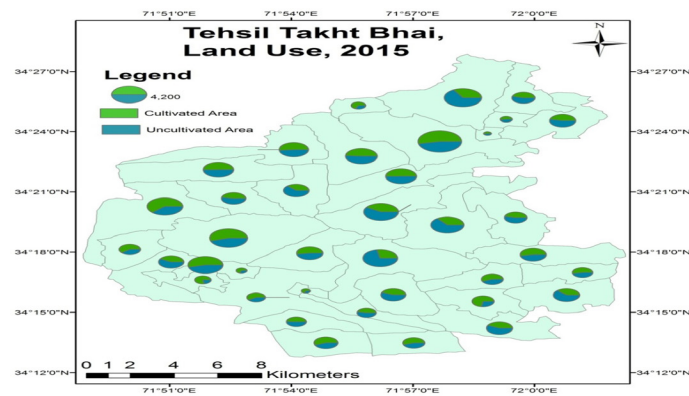


Figure 8: Tehsil Takht Bhair, All Villages' Cultivated and Uncultivated Land, 2015.

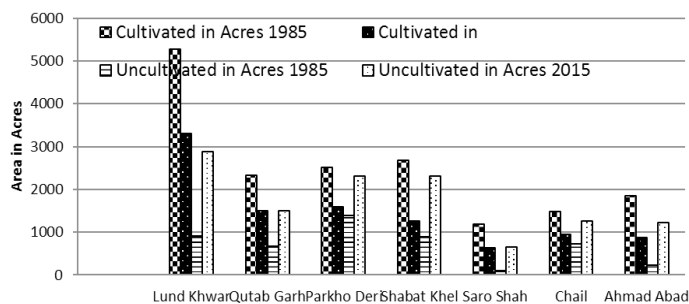


Figure 9: Sample Villages Comparison in Cultivated and Uncultivated Land, 1985 and 2015.

Conclusions and Recommendations

In tehsil Takht Bhair the cultivated land is consistently engulfing by built-up area. The analysis revealed that the cultivated area was the major land use in 1985, occupied 146 square kilometer area to the total land uses. Similarly, the built-up area occupied 100 square kilometers in 1985. The analysis further revealed that in 2015, the cultivated area in the tehsil is reduced to 91 square kilometers, by losing 55 square kilometer area in past thirty years, with a rate of 1.6 square kilometer area per year (Reported from images, got from GIS). Similarly, if the cultivated area is losing in this acceleration then up to 2055 there will be no agricultural land in tehsil Takht Bhair for farming. The analysis revealed that the loss in cultivated land is attributed to high population growth rate in the

tehsil Takht Bhair. The total population of the area was 315,793 in 1985, with a population density of 762 persons per square kilometer. Similarly, in 2015 the estimated population of the study region is 664,223, with the population density of 1604 persons per square kilometer. This increase in population is attributed to increase in built-up area in the tehsil Takht Bhair. The built-up area increased to 156 square kilometers in 2015, showed a total increase of 56 square kilometer area in past thirty years.

The increase in built-up area of tehsil Takht Bhair indicates that to gratify the requirement of growing population more and more land was brought under built environment in the form of new houses, roads, commercial center, educational institutes and health institutes in the study area. The annual increase in built-up area is 1.8 kilometer during the study period from 1985 to 2015 in tehsil Takht Bhair. The analysis further revealed that if the built-up area is increasing in such a speed then in the next few decades the area of tehsil Takht Bhair will be totally covered by built-up area. Moreover, it is revealed from land use change analysis that the loss in cultivated and cultivable waste land is equal to the area gained by built-up environment during the study period from 1985 to 2015 in the tehsil.

On the basis of the findings of the present study, it is suggested that proper attention is needed to control the miss-use of agricultural land for infrastructure. Population growth is the main cause of land conversion from agricultural farm land to infrastructure like Houses, roads, industrial buildings etc. Because, high population growth rate intensify the needs of growing population for survival and also increase the use of farm land for infrastructure. To satisfy the needs of the existing population, proper polices should be design for new built up in the study area as well as for the whole country to restrict the loss of agricultural land. It may create challenges for the next generation to secure their food requirement. Infrastructure is necessary but proper allocation for such infrastructure can make the situation less worsens.

Novelty Statement

The current research highlighted that High population growth rate attributed to land use dynamics and it adversely affect fertile land. Such used of fertile land

for infrastructure adversely affect agricultural production which is a challenge for policy makers to feed the growing population.

Author's Contribution

Sajjad Ali: GIS analysis, methodology development, questionnaire's preparation, data collection and analysis, drafting of research paper.

Atta-ur-Rahman: Development of spatial database, analysis, reviewing and editing of the manuscript.

Sher Ali: Literature collection, data collection and questionnaire's preparation.

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