Deforestation Drivers in Tehsil Barawal Dir Upper Pakistan

Anwar Sajjad Syed Adnan **, Ahmad Hussain***,*

**Department of Environmental Sciences, University of Haripur ,KPK Pakistan (anwarsajjad7@gmail.com)*

*** Institute of Geographical Information Systems, National University of Sciences and Technology (NUST), Islamabad, Pakistan (syedadnan_gis@yahoo.com)*

**** Department of Forestry and Wildlife, University of Haripur,KPK Pakistan (ahmaddof@yahoo.com)*

Abstract

The study area Tehsil Barawal, District Dir (U) of forest has facing serious problems of deforestation. The forest of the study area is ever green forest tress like (*Cedras deodar*) *(Abies pindrow), (pinus roxbergai), (Picea smithiana),* and *(Pinus wallichiana)* are dominate tress. The focus of the study area was to explore the various drivers of the deforestation. The study was based on field survey and GIS and remote sensing techniques. The results of field survey revealed that there are seven drivers of deforestation, source of income from forest, fuel forest collection, illiteracy rate, agriculture expansion, forest fire, illegal cutting/harvesting and encroachment. The field survey shows that 40% people agreed that the major driver of deforestation in the area is agriculture. Study on the GIS and remote sensing techniques to explore the various drivers of the deforestation from year 2000 and 2012. In this study the images of 2000 and 2012 were downloaded from landsat 5 satellite. Five key classes such as forest, agriculture, barren land, snow and water were acknowledged. The result showed that the study area Tehsil Barawal, District Dir (U) of forest, barren land, agriculture, water and snow in year 2000 was 49.54%, 43.38%, and 5.19%, 1.40% and 0.49% and the area in 2012 was 37.17%, 41.36%, and 12.69%, 5.05% and 3.72% respectively. After data analysis it was cleared that 2.02% decrease in barren land, 12.37% decrease in forest and 7.5% increase in agriculture land and was identified. Therefore from field as well as from GIS and RS results that was cleared that agriculture is the key driver of the deforestation study area.

INTRODUCTION

Forests area of Pakistan is 4.8 million hectare(Lubna, 2001; Government of Pakistan, 2005). Pakistan forests resources comprise one of the most established and second biggest Juniper forests on the planet. These are for the most part evergreen characteristic forests of conifers, developing between rises of1500-9000 meters above ocean level in the northern sloping areas of Pakistan. Pakistan have distinctive sorts of forests such is slope pine forests is clean ragged or foot slope forests, watered manors, Riverside and mangroves forest in the delta of Indus River (Qazi, 1994). The northern part of the nation is ruled from the evergreen forests (42% in Khyber Pakhtunkhwa and 16.6% in Gilgit Baltistan and 7.7% in Azad Kashmir).Theseforests to a great extent arranged in Khyber Pakhtunkhwa and spread over the mountains of Hindukush, Himalayas and Korakoram and brushy and coniferous forests are for the most part begun from the upper slants of area Swat, Dir, Mansehra and Chitral while thehigh and sub snowcapped fields are found on the edge of the mountains (Khan, 2009) Globally forest lands six million hectare are changed because of logging,horticultural, mining and other human exercises (Verburg et al., 2006).The United Nations Framework Convention on Climate Change reported that the agribusiness was the key reasons for deforestation. 48% of deforestation is agriculture

subsistence cultivating, 32% of deforestation is dependable fuelforest, 14% logging is in charge of deforestation and 5% of forest accumulation is capable of deforestation (UNFCCC, 2007). As indicated by (Siddiqui et al., 2006) Pakistan is the second most astounding deforestation nation in worldwhere yearly deforestation rate is 4.6 %. (Verburg et al., 2006) reported that overall six million hectare forest terrains are modified because of agriculture, logging, mining and other human practices. The (Khan& Naqvi 2000) reported that in Khyber Pakhtunkhwa trees and forest assets have a key part in the rustic vocation. The greater part ofpeople groups rely on upon forests for timber for houses and fuel forest feed for occupations. What's more, forest individuals gather different non-timber forests items for use at the family unit level and for money wage. As per the United Nations Framework Convention on Climate Change (UNFCCC) 48% agriculture practices was the significant reasonfor deforestation while 32% of deforestation is responsible for business agriculture,logging is in control 14% for deforestation and 5% of fuel forestgathering is accountable for deforestation (UNFCCC, 2007).

There are two primary drivers of deforestationimmediate and backhanded (Helmutet al, 2002). Direct drivers are those causes specifically prompting forest decrease. For instance, forests into horticultural area exorbitant logging. The (Rademakers et al., 2010) characterize aberrant drivers are an unpredictable association of financial, administration, innovative, and demographic. As per (Boakyeet al., 2008), because of human initiates the vegetation spread happened changes (development of populace) and natural impacts likely variability in atmosphere. The human exercises, for example, horticultural works on, mining, infrastructural and other anthropogenic exercises are the real reasons for ecological debasement (Yang, 2001) and as indicated by (FAO, 2006) Forest spreads are quickly corrupted because of social,monetary and multi social factors.GIS and Remote detecting has been proficiently andbroadly utilized much as a part of single topical examination of, for example, land utilize and arrive spread change mapping (Lambing, 1997), forests screen (Rogan et al., 2002), watershed administration and forest fire administration (Kachmar and Sánchez-Azofeifa, 2003) and forest approach evaluation (Nagendra et al., 2005). Remote detecting the flying photography thinks about demonstrate that in Khyber Pakhtunkhwa the rate of deforestation is tremendous and inside 30 year entire forest will vanish. Real advance has beenmade in tree ranch on farmland however it can't adjust the loss of regular forest (Suleri, 2006). Therefore the motivation behind the study was to recognize diverse drivers of deforestation in study territory Tehsil Barawal District Dir (Upper).

Materials and Method

Study Area

Tehsil Barawal is one of the tehsil dir upper which is dominated from various forests. The range found north of the territory lays Chitral, Afghanistan on west, Dir upper forests on

east and District lower Dir in south part of theTehsil Barawal. All out house hold of the region are 350 according to region censes report of upper Dir 1998 (Upper Dir, 1998). The height of the region is begun from 4200mto 6700m. Tesil Barawal is ruled by assorted sort of forests i.e deodar (Cedras deodar) and spruce blended fir (Abies pindrow) and (pinus roxbergai) forests, (Picea smithiana) blue pine (Pinus wallichiana), forests and diverse natural products trees.

Methodology

A definitive reason of the field overview was behavior to amass subjective and quantitative data to better perceive the drivers of deforestation in the area. The primary study was completed on August and September 2013 between 08:00 am and 16:00 pm which is the most vital time of individual's exercises. The aggregate populace of study territory is 61674. Study area covers three Union Councils i.e. Barawal Bandi, Darkand, Shahikot, The house hold of the area are around 350. The 75 questioners were gathered from three union committees. Neither the survey was lost nor returned fragmented along these lines having 100% reaction rate. For drivers of deforestation additionally includes arrangement and amendment each remotely detected image. After the image grouping recognizably, thought about the subsequent maps on a pixel-by-pixel premise utilizing a change discovery grid. The streaming strides was do in strategy of image handling; (1) Data accumulation, 2) Data readiness, 3) Supervised image arrangement, 4) Analysis and 5) Preparation of progress location maps. These applications was done utilizing ERDAS envision 9.2 and Arc GIS 10 programming.

(1) Data Collection

The200 and 2012 images were downloaded for exploration information from the landsat 5 satellite Of the United State of Geological Survey site (http://glovis.usgs.gov/).

(4) Analysis

Subsequent to finishing handle review, every one of the information were go into Statistical Package for Social Sciences (SPSS) form 19. The enter information were cross check and blunders were perfect by the key examiner. In the wake of cleaning the information, investigation was done through SPSS for every one of the variables. GIS and remote detecting information are orchestrated from ARIC GIS 10 and Eradas programming.

3. RESULTS AND DISCUSSION

1.1 *Field Survey Data*

A Field survey was conducted in the study area to find out the main cause of deforestation and agriculture development

Respondents level of Education in the Study Area Barawal Dir Upper

Table 4.6 depict that majority of respondent were illiterate 60% followed by 24% metric and 12% are undergraduate while very few 4% of them have attained post graduate.

Table 0.1: Assessment of Education level in the Study Area of Barawal Dir Upper.

S.no	Education	Frequency	%age
1	Illiterate	45	60
2	Metric	18	24
3	Undergraduate	9	12
4	Postgraduate	3	4
	Total	75	100

Respondents Source of Income in the Study Area Barawal Dir Upper

The table 4.10 shows the respondent's source of income. The data indicated that economically 44% respondent are dependent on forest where as 34.67% of respondent depend on agriculture. Similarly 12% are dependent on livestock, 6.66 % Govt. services and 4% have their own businesses.

Table 0.2: Respondent's source of income in Study Area Barawal Dir Upper.

S.No	Income Source	Frequency	%age
1	Forest	33	44
2	Agriculture	25	34.67
3	Livestock	9	12
4	Govt. servant	5	6.66
5	Business	3	4
	Total	75	100

Respondents land use classes in Study Area Barawal Dir Upper

From the table 4.8 it was clear that 44% respondents have forest land while 26% of respondents have agriculture land. The reaming 6% respondents have range lands whereas the remaining 10% respondents have barren lands. There are only14% respondents that have mixed land.

Table 0.3: Respondents land use classes in Study Area.

S.No	Land type	Frequency	%age
1	Forest	28	44
2	Agriculture	16	26
3	Range land	4	6
4	Barren	6	10
5	Mixed land	9	14
	Total	63	100

Respondents Fuelforest Collection Per Day Amount in Barawal Dir Upper

Table 4.13 shows the respondent fuel forest collection from 1 to 30 Kg per day is 86% and 31 to 60 Kg fuel forest collection per day is 6% while 61 to 90 Kg fuel forest collection is 5%. The minimum number of respondent used more than 90 Kg is 3%.

Table 0.4: Respondents Fuel forest collection per day amount in Study Area Barawal Dir Upper.

S. No		Fuelforest collection in Kg	Frequency	%age
1	One day	1 to 30 Kg	54	86
2		31 to 60 Kg	4	6
3		61 to 90 Kg	3	5
4		More than 90 Kg	2	3
	Total		63	100

Respondents View about Causes of Deforestation in the Study Area Barawal Dir Upper

Table 4.11 and show that 40% respondents agreed that agricultural practices are the main cause of deforestation while the 24% agreed that fuel forest collection caused deforestation in the study area. The 19% respondents' view that it is Illegal cutting/ harvesting and while the 9% agreed that encroachment caused deforestation. According to 8% of respondents forest fire is also one of the causes of deforestation.

Table 0.5: Respondents View about causes of deforestation in the Study Area Barawal Dir Upper.

S.No	Deforestation Cause	Frequency	%age
1	Agriculture	30	40
2	Fuel forest	18	24
3	Illegal cutting/ Harvesting	14	19
4	Encroachment	7	9
5	Forest fire	6	8
	Total	75	100

Image Classification of the year 2000

The of year 2000 satellite image was arranged into five fundamental classes. The results demonstrate that the area of forest, barren land, agriculture, water and snow was 19349, 16995, 2028,549 and 188 hectares (Table 1). The Fig 3 demonstrated that the forest areas is present in South-East and south west of the study territory while the agriculture is generally packed in the North-West of the study region. Where the North-East parts have low agriculture land. The barren area is for the most part begun in the focal parts and in the North-East parts. In the northern side peaks of mountain snow was also originate.

Table 6. Classification Results of the Image 2000.

S. No	**Class Name**	**Area of the year 2000 hec**	**%age**
1	Forest	19349	49.54
2	Barren	16945	43.38
3	Agriculture	2028	5.19
4	Water	549	1.40
5	Snow	188	0.49
	Total	39059	100

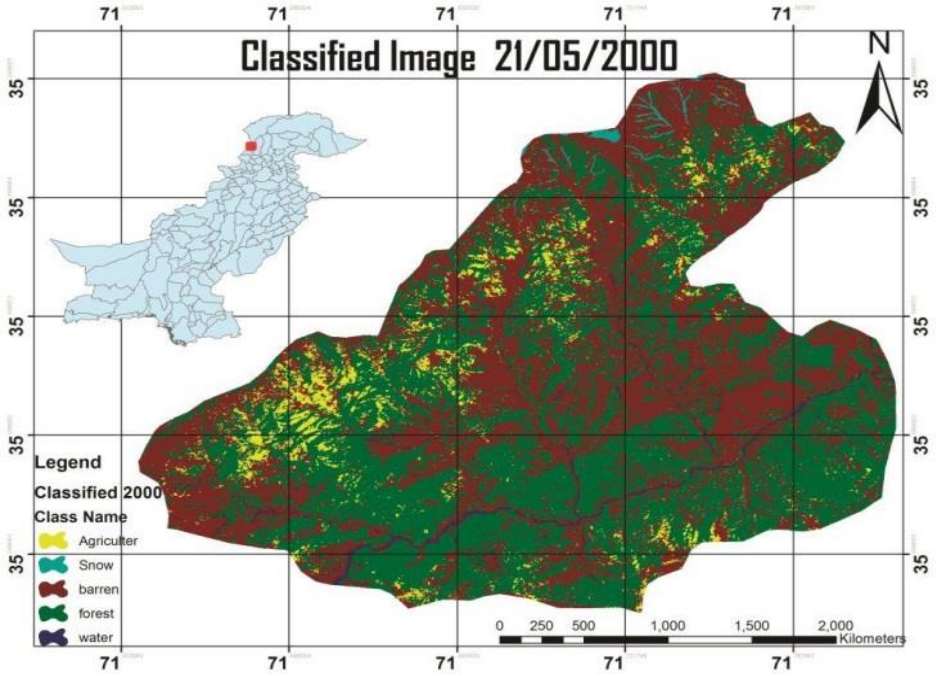

Fig 1. Classified image of the year 2000.

Image Classification of the year 2012

The year of 2012 satellite image was divided into 5 classes like that of 2000. The result showed that the region of forest,barren area, agriculture, snow and water was 14522, 16156, 4958, 1450 and 1973 hectares (Table 2 and Fig 4). The Fig 4 showed that the agriculture headways has been started in forest districts which was determined in the South-East and South-West part in 2000, as an outcome of the which forests area has decreased in such area. Correspondingly the agriculture area has been further urbanized and elevates in the North-West side of the study range while the North-East side has moreover genuine agribusiness changes.

Table 7. Classification results of the image 2012.

S. No	**Class Name**	**Area of the year 2012 (hec)**	**%age**
1	Barren	16156	41.36
2	Forest	14522	37.17
3	Agriculture	4958	12.69
4	Water	1973	5.05
5	Snow	1450	3.72
	Total	39059	100

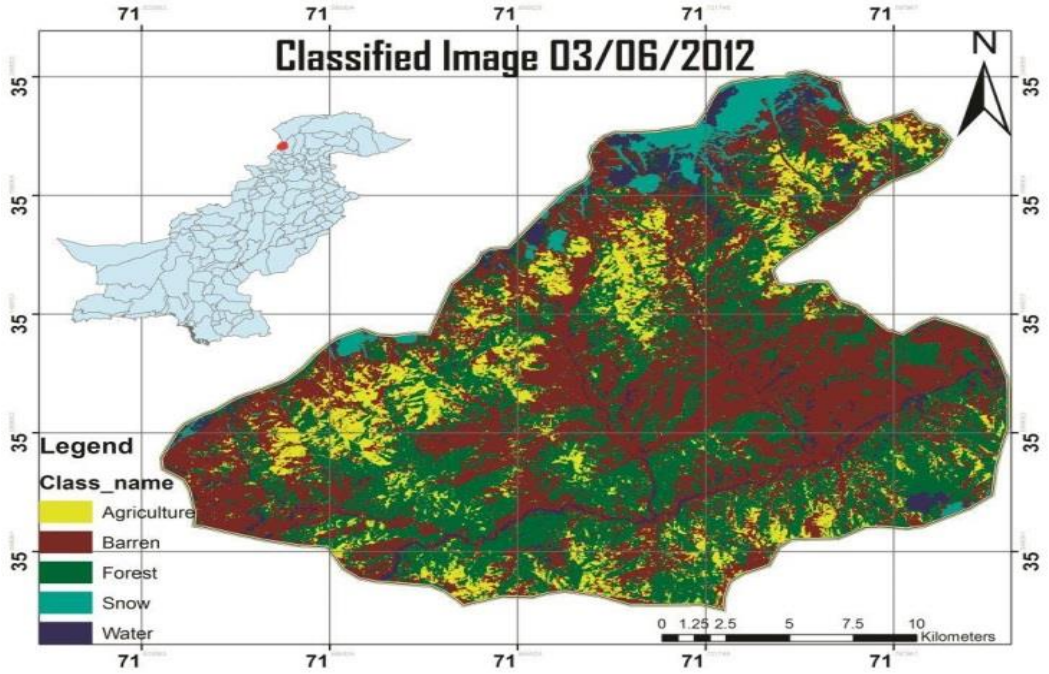

Fig 4. Classified Image of the year 2012.

Changes in land use and land cover from 2000 to 2012

The table 3 shows the assessment that the amount of measure of changes has been happened from 2000 to 2012. The results showed that the forests range has been reduced up to 4826 hectare which makes up around 12.37 % from that of image 2000. So likewise the agriculture area has extended around 2930 hectares which make up around 7.5 % extension.

Table 8.Land use land cover changes from 2000 to 2012.

S. No	**Class Name**	**Area 2012**	**Area 2000**	**Area 2000 - Area 2012**
1	Agriculture	12.69	5.19	7.5
2	Barren	41.36	43.38	-2.02
3	Forest	37.17	49.54	-12.37
4	Snow	3.72	0.49	3.23
5	Water	5.05	1.4	3.65
	Total	100	100	

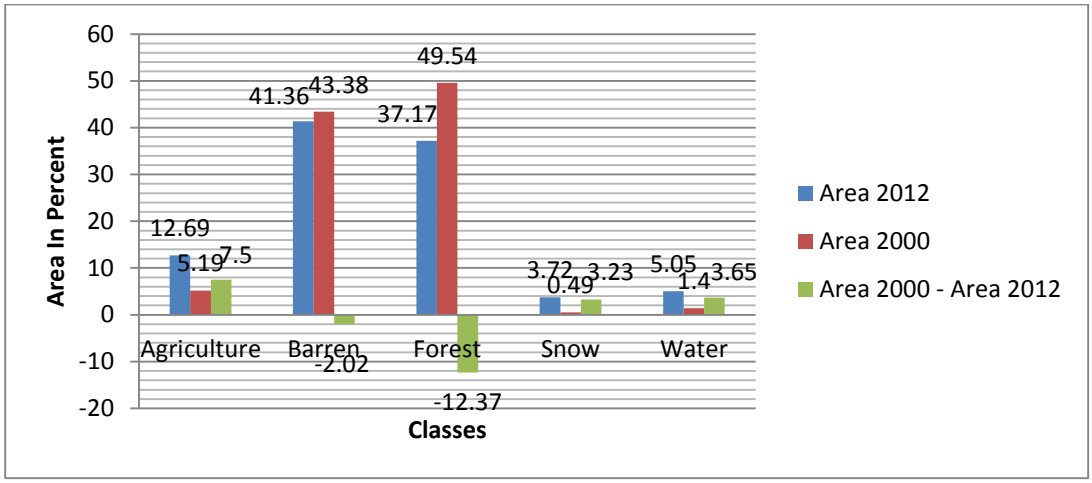

Fig5. Land use land cover changes from 2000 to 2012.

DISCUSSION

The present study was based on satellite image and field survey to identify the drivers of deforestation in the study area

DRIVERS OF DEFORESTION

The greater part of residents in study area Barawal Dir upper are unaware and people did not understand the significance of trees Due to this reason people doing deforestation in the area. Forest spread diminished in study territory Barawal Dir upper because of fuel forest gathering the (Table 4.11) demonstrated the fuel forest accumulation per family unit every day i.e. gathering of 1-30 kg fuel forest for each family unit every day since forest has a noteworthy part to play in meeting the household vitality prerequisites. There is no other current office like gasses, power and lamp fuel oil accessible, so individuals just gathered the fuel forest for cooking and warming (Table 4.13). As indicated by (Bekure, 1996) fuel forest gathering and infringement are the key reasons of forest spread change in Ethiopia and (Shackleton, 2004) reported that the 80% of country families in South Africa use fuel forest for vitality purposes. The forest is likewise utilized for development purposes and assembling furniture and so on. Distinctive studies have communicated that the forest area is changed to farming (Fombed, 2009; Gibbs et al., 2010) and it is likewise accepted that the interest of sustenance will be expanded to 70% by 2050 (FAO, 2009). The study range has been confronting difficult issue of timber mafia so 19% of the respondents were of the perspective that illicit cutting and collecting is the reason for deforestation while 9% accounted that infringement brought about deforestation.

To get quantitative data about forest in Barawal Valley from 2000 to 2012 a forest spread change identification was done utilizing remote detecting and GIS methods.

A post-order procedure as utilized by (Coppin et al., 2004) was connected for grouping and quantitative information examination on both satellite images of 2000 and 2012.

From 2000 to 2012 the forest area is diminished by 12% and agriculture area is expanded by 7%. These outcomes are like a study directed on forests spread change evaluation in Swat and Shangla which demonstrates that there was around 13% diminishing in forests in Swat and 11% in Shangla (WWF, 2009).

CONCLUSITONS AND RECOMMENDATIONS

It is done up from the happen that the forest spread is reduced as a result of the seven drivers of deforestation. These fuses (i) wellspring of pay from forest (ii) fuel forest accumulation (iii) absence of education rate (iv) agriculture (v) fuel forest (vi) Illegal cutting/collecting (vii) infringement. The greater part of inhabitants in study range Barawal Dir upper is unskilled and individuals did not understand the significance of trees. Instruction assumes huge part in spreading information and getting creative contemplations to grow family profit through differing hotspots for feasible business. It is likewise cleared that 40% of the respondents established that rural practices were the primary driver of deforestation in study region Barawal Dir upper. So also the forest spread diminished in study region Barawal Dir upper because of fuel forest gathering per family unit every day i.e. gathering of 1-30 kg fuel forest for each family unit every day. The characterization aftereffect of satellite image of year 2000 demonstrated that the percent range of forest, farming, desolate land, snow and water bodies were 49.54%, 5.19%, 43.38%, 0.49% and 1.4% individually. So also the grouping aftereffect of satellite image of year 2012 demonstrated that the Forest, Agriculture, Barren area was, Snow and Water bodies were 37.17%, 12.69%, 41.36%, 3.73% and 5.05% separately. From 2000 to 2012 the forest area is diminished by 12% and farming range is expanded by 7%.Due to high deforestation rate and expanded rural exercises it is prescribed that mindfulness battle ought to be propelled in the study area to shield and ration this forest from further deforestation.

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