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Evaluation of timber and fuel wood consumption and its impact on vegetation cover in northern parts of Pakistan.

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Key words: *Cedrus deodara,* Fuel wood, Timber wood, Rapid wood cutting, Hindukush range

Abstract

The present study aims to investigate the deforestation and effects of floods on various plants in Northern parts of Pakistan. Data was collected from the local people. The data shows that due to drastic and rapid cutting of trees is the major cause of deforestation. The data were recorded in the form of questioner after that, the recorded data were analyzed by SPSS (Statistical programmed for social sciences) software. The trees are ruthlessly cut for burning, timber and furniture purposes. The highest ratio of cutting trees is for burning purposes. *Cedrus deodara, Querqus dialata, Betulla utillus, Juglans regia, Picea smithiana, Pinus willichaina*. Land sliding and floods are the second highest reason of deforestation. The deforestation also affects the growth of other plant species as its ground flora. The shade and moisture loving plants (Sciophytes) disappear due to deforestation while the halophytes dominate the cleared area. Due to anthropogenic activity and rapid cutting of valuable species of the area affect the climatic condition of the site.

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Introduction

Kalam valley is situated in the northern part of district Swat of Khyber Pukhthoonkhwa province of Pakistan, known for its lakes, profuse green hills and waterfalls. It is a popular destination for tourists all over the world. It is located between 35° 26° to 35° 50° North latitude and 72°22° to 73°49° East longitude and spread over approximately on 17214 hectares. It is bounded on the East by Indus Kohistan, on the South by district Swat, on the North by Gilgit and on the North-west by district Chitral. Population of Tehsil Kalam is about 135,000 with a growth rate of 3 percent per annum (census, 1998). Fuel wood is the main resource of energy in kalam valley. The use of wood by mankind for energy purposes is as old as human civilization itself. One of the most serious problems in the developing world is shortage of fuel wood. Pakistan is experiencing rapid increase in its national energy consumption with increasing population and economic development. (Hamayaun, 2005). Sheikh (1987). it is estimated that, fuel wood meet about 50% of domestic energy requirement while 16% are Shared by the fossil fuels and burning dung and crop residues generated 34%. The economic importance of firewood production is evidenced from the fact that its consumption in Pakistan is larger than any other use of wood.

In northern areas of Pakistan due to lack of household energy sources, like electricity and gas, fuel wood is an important component of daily life in Pakistan and it covers about 53% of total annual domestic energy needs (Government of Pakistan. 1997). According to estimates, 70-79% of Pakistani households use fuel wood as a main source of energy (Hafeez SM. 2000, Siddiqui KM. 2000.).

Fuel wood is primarily used for cooking and heating purpose in the rural regions of Pakistan where gas is not available for the purpose. Dependency on fuel wood is expected to remain high in Pakistan in the near future, as the country's economic development is not strong enough for a shift from traditional to modern fuels (Siddiqui KM and Amjad M. 1993). The high demand for domestic fuel wood is believed to be the cause of Pakistan's rapid depletion of forests [Government of Pakistan. 1992],

The World Conservation Union (IUCN) has estimated that with the current population growth, wood consumption in Pakistan would increase by 3% per year. Hence, IUCN (The World Conservation Union. 2002) claimed that if present rate of deforestation continues, Pakistan's forests may vanish within the next 10-15 years. Khan & Khatoon (2008) reported data regarding fuel and timber wood from various parts of Pakistan.

Fuel wood is primarily used for heating and cooking purposes in almost all the rural areas of Pakistan Siddiqui and Amjad (1993). people use wood as fuel and timber producing species, which affect the forest resources in the area Jan *et al*, (2011) Forests are the main source of timber, firewood, fodder and food for most of the villagers in the Himalayan region Vishwambhar (2012). Information and data on fuel wood collection and consumption in Pakistan and its impact on natural forests are not available, Information and data on fuel wood collection and consumption in Pakistan and its impact on natural forests are not available, despite of its importance for national economy. This is especially true for the Western Himalayan region in the Northern Areas (Ali J and TA Benjaminsen, 2004) people in mountainous areas of Pakistan use plants for various ailments and for long time they have been dependent upon plant resources for their food, health, shelter, fuel, timber and other purposes (Hussain & Khaliq, 1996; Ahmad *et al*., 2009; Alam *et al*., 2011). Therefore an attempt has been made to analyze the impact on vegetation cover which will provide baseline information for further studies Planning for the sustainable utilization of plant species and there use as indicator species. It is further expected that such study whould be worth seen for the development of plants for maintaining the ecological balance and conservation of species in the area.

Material and methods

Field survey of Study area.

The studied was conducted in the year 2014 and 2015. Information was obtained from various forest regions of Kalamvalleyie. Kokonail, Jalbanr,

Hiraneja warkas, Gahil, Ushoran, Matiltan. According to the official census report in 1997 the total population of Kalam tehsil is 31000. But the population in winter is decreased that is why the Fig. is so slow. Most of the Kalami people go to plain areas in winter due to heavy snow fall they lift their houses for better living. The total population are approximately 50,000 and above. Main villages of Kalam valley are Koknail which is populated area and is located in East of Kalam valley, Pakistan. The Approximate elevation above sea level is 2068 meters.

Two methods were employed for the collection of data pertinent to the fuel wood consumption in this remote Hindukush region. First, questionnaire was developed for taking representative information pertinent to fuelwood species and the quantities of wood consumed during spring, summer and winter season. Secondly, information were collected from published data, forest management plans etc and books. For field information frequent visits were arranged to various places in different months of the season 2014-2015. Regualr trips were arranged in the forests for observing and reporting the forest types. Plants were collected during the trips. The collected plants were identified from available literature (Aliflora of Pakistan 1978).

Randomly questions were asked during trips to various villages and data were recorded. Different questions were asked from local citizens of different age. (Table 1-2). The questions are given in the sample questioner. Some sample questions were, what type of wood is utilize as a fuel, what is the price of wood in the market, quantity of wood used per week etc. What type of wood mostly used for timber (Furniture, construction)? It was also asked that what type of woody trees have been drastically decreased due to rapid cutting and plants which were present in your area few year back but now either present, diminish or totally disappear. What are the notable changes due to past flood, earth quakes and land sliding? Before deforestation what types of plants were present as ground flora and after cutting they have been perished, and what types of new plants appeared after deforestation.

The data were recorded in the form of questioner after that, the recorded data were analyzed by SPSS (Statistical programmed for social sciences) software. Samples of plants were collected in different seasons. Plants were dried and pressed through plant presser. Dried specimens were mounted on the standard herbarium sheets. Voucher specimens were submitted in Post Graduate Botany Department Jahanzeb College Saidu Sharif Swat.

Table 1. Age of the Respondent.

Age	Frequency	Percent	Valid Percent	Cumulative Percent
18	3	5.0	5.0	5.0
19	1	1.7	1.7	6.7
20	1	1.7	1.7	8.3
22	2	3.3	3.3	11.7
23	1	1.7	1.7	13.3
24	1	1.7	1.7	15.0
25	3	5.0	5.0	20.0
26	3	5.0	5.0	25.0
27	1	1.7	1.7	26.7
28	1	1.7	1.7	28.3
29	1	1.7	1.7	30.0
30	2	3.3	3.3	33.3
32	1	1.7	1.7	35.0
33	2	3.3	3.3	38.3
34	3	5.0	5.0	43.3
35	2	3.3	3.3	46.7
37	1	1.7	1.7	48.3
40	5	8.3	8.3	56.7
41	1	1.7	1.7	58.3
43	2	3.3	3.3	61.7
44	2	3.3	3.3	65.0
45	2	3.3	3.3	68.3
46	1	1.7	1.7	70.0
47	1	1.7	1.7	71.7

Age	Frequency	Percent	Valid Percent	Cumulative Percent
50	1	1.7	1.7	73.3
51	4	6.7	6.7	80.0
52	1	1.7	1.7	81.7
55	2	3.3	3.3	85.0
57	1	1.7	1.7	86.7
60	5	8.3	8.3	95.0
65	1	1.7	1.7	96.7
70	1	1.7	1.7	98.3
71	1	1.7	1.7	100.0
Total	60	100.0	100.0	

Table 3. Quantityof wood used per week.

Quantity	Frequency	Percent	Valid Percent	Cumulative Percent
100.00	4	6.7	6.7	6.7
125.00	1	1.7	1.7	8.3
150.00	7	11.7	11.7	20.0
200.00	5	8.3	8.3	28.3
250.00	8	13.3	13.3	41.7
300.00	9	15.0	15.0	56.7
350.00	4	6.7	6.7	63.3
400.00	6	10.0	10.0	73.3
450.00	2	3.3	3.3	76.7
500.00	9	15.0	15.0	91.7
550.00	2	3.3	3.3	95.0
600.00	2	3.3	3.3	98.3
650.00	1	1.7	1.7	100.0
Total	60	100.0	100.0	

Results

Local people use about 34 plants as fuel wood consisted of *Cedrus deodara, Querqus dialata, Betull autilus, Indegofra heterenta, Parrotiopsisj cquemotii, Querqus inacana, Querqus semica arpifolia*. The daily use consists of 40% of *C. deodara* 40% *Q. dialata*, 10% *B. utillus* 8.3% *Indigofera heterenta* and 1.7% *Querqus semicarpifolia*. (Fig. 1) Some of valuable trees like *Cedrousdeodara, Pinuswilli china, Piceasmithiana, Juglansregia, Pinus gerard iana, Taxus wiilchaina, Abies pindrow* are ruthlessly utilized for timber requirement. Timber use of the local people is *C. deodara,* 40%, *P. wiilichina* 20%, *Picea smithiana* 20%, *Taxus wiilchaina* 8.3%, *J. regia* 6.7%, *Abies pindrow* 3.3% and *Pinus gerardiana* 1.7%. (Fig.2).

The quantity of fuel wood used is about 323.75 kg/week , 6.7 % people used 100 kg/week, 125kg used 1.7 people % , 150kg used 11.7% people , 250kg used 13.3% people. (Fig. 3) the quantity of wood used with market price is 1618.75 (Fig.4). Plant affected by rapid cutting are *Querqus dialata* 3.3%, *Maluspumilla* 10%, *Abiespindrow* 13.3%, *Pinusspsp* 16.7% *Cedrusdoedara* 23.3%, *Juglansregia* 33.3%. (Fig. 5).

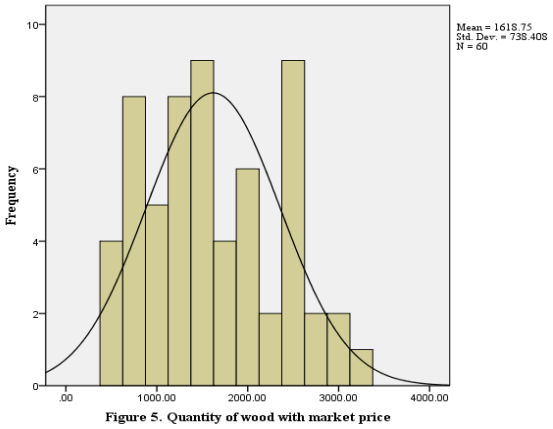

Fig. 1. Quantity of wood used with market price.

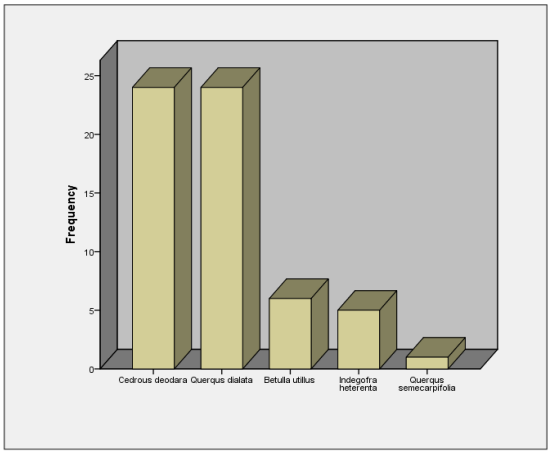

Fig. 2. Wood used Fuel.

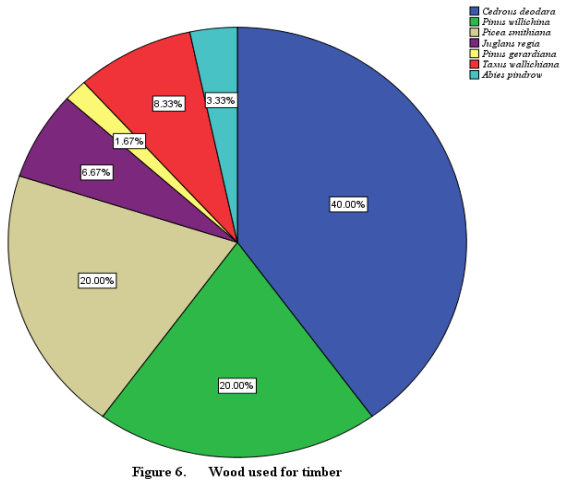

Figure 6. Wood used for timber

Fig. 3. Wood used For timber.

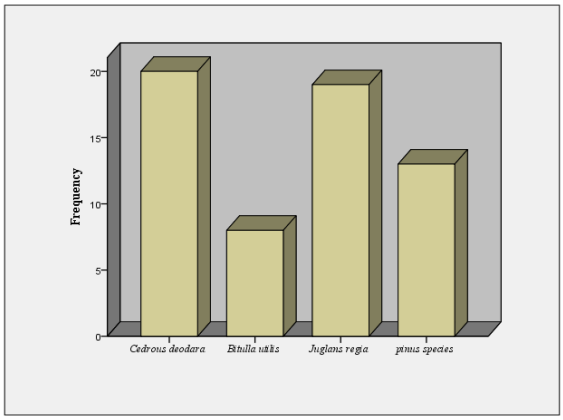

Fig. 4. Plants affected by flood or land sliding.

Fig. 5. Whole tree of Juglansregia Cutted for Fuel use.

Due to deforestation the increase in some type of plants took place i.e. *Bistorta amplexicaulis, Viluriana officinale, Vibernum grandifolium, Vibernum cotinifolium*. These species basically grow well in bright light, therefore when the shade of thick forests finished, they started to grow. Some species disappear due to the loss of shade. Because shade loving plants used to grow in shades that is provided by the forest trees? When the shade of the trees disappeared due to any reason these shade loving plants also disappeared. Examples of such plants are mosses i.e *Polytricum,* liverwortslike *Targeoniasps,* shade loving grasses and various lichen which were growing on trunks of the trees. Fungal species also got adversely affected by cutting of trees i.e. *Agaricus spescis, Morchellasps (M. esculenta)* and *Polyporous species* which are drastically affected. Due to flood and land sliding *Cedrus deodara, Juglan regias* and *Betulla utilis* were affected. (Fig. 5-6). The top most fertile soil is carried away by water and replaced by rock and gravel which is not suitable for most of vegetation.

Fig. 6. Cutting of Cedrousdeodarain one direction after wind blow the tree fall down and then utilized.

Discussion

In the hilly areas of Swat there is no alternative source of wood for fuel therefore they cut trees for daily uses. (Fig.6) Research was conducted on Kalamvalley, which is situated in the northern part of District Swat, Khyber Pakhtoonkhwa, Pakistan.

Mostly in November, snow fall starts on the top of mountains. Before snow fall people collect woods from the forests and burn to cope with the chilling winter and cooking purposes. In 2010 flood affected various types of plants which were used for medicines, fuel and timber. Species that were affected are *Cedrus deodara, Juglans regia, Pinus wallichiana, Abiespindrow*, *Querqus dialata,* and *Taxus wallichina*. It has been recorded in the present work that most of the plants have been affected due to flood, land sliding, and cutting by local people and timber mafia.

Local people cut one side of tree in the direction of air. (Fig.7) During wind blow the tree falls down and then utilized to deceive the local administration, in such a sense that the tree has been fallen. According to the local people, late Wali Swat "Main Gul Abdul Haq Jahanzeb "Wali Swat had imposed strict bane on timber cutting and only branches of the trees were allowed for burning purposes. When he handed over Swat to state of Pakistan in 1969, there remained no longer the tight control of Govt. institutions to control rapid cutting which led to deforestation. Rapid cutting of trees are still in progress. Local people use trees as a source of fuel, construction of houses and timber purposes. Awareness in local population developed in late 90s. The cutting of trees and its transportation is now locally banned. People even today, remember the period of Walis Swat as a golden age. They think that the forest related rules during the "SWAT STATE" were best because 46 year back there were thick forests due to very tight check on cutting.

Recommendations

In order to save the remaining forests and relieve pressure on firewood species, following recommendations are suggested.

Conservation

Natural resources are to benefit the public but their proper and sustainable utilization are required. Forests are one of these natural resources. It provides us fuel for cooking, timber for furniture and construction, medicinally and edible important plants, habitat for many animals which keep the balance of our ecosystem, consume carbon dioxide and produce oxygen. Therefore conservative uses of forests are necessary.

Sustainable and manageable use

Dead, top broken and old trees should be selected when required for use. When trees get very old their growth is stopped naturally. Therefore selection of old trees should be done to avoid growing and young trees. The use of dead trees will provide a chance for living and growing trees to survive.

Protection

During the cutting process the cutters damage young growing plants and seedlings due to either carelessness or to provide space for easy movements. Therefore during cutting young plants must be protected.

Plantation

Under big trees very few plants can grow. When the big trees are cut down a large space becomes free. Therefore new more plants must be grown in the space and it must be made compulsory to look after the newly implanted plants. The look after process must be kept for several years. Normal regeneration practices should be adopted.

Conservation

The look after process must be kept for several years. 5-10 year proper care of newly planted plants mustbe required.

Awareness through environmental education

Proper awareness is required in the community. Over exploitation and consumption of important plants should be reduced. Only medicinally important parts must be used. The complete Uprooting and over consumption of medicinally important plants should be strictly banned.

Alternative source

In these mountainous areas there is no alternative source of fuel. The local population completely depends on the forest for fuel wood and timber which increases pressure on forest. Supply of natural gas in these areas can minimize the pressure on forest.

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