

ESTABLISHING LINKS BETWEEN WOOD TRADING, GRAZING AND MINING ACTIVITIES WITH THE UNDERLYING TRENDS OF CONTINUOUS DECLINE OF NATURAL SCRUB FOREST COVER IN THE SOAN VALLEY

AMIN U. KHAN AND FARID AHMAD

Sustainable Development Study Center, G.C. University Lahore, Lahore-Pakistan.

Abstract

In this study information from the wood dealers in the valley and grazing and mining activities in the public forest was obtained in the form of questionnaire based survey. It was then used to generally analyze the underlying trends of increasing degradation of the natural forest in the Soan valley. The study provided strong evidences that excessive extraction of wood, increasing trends of grazing and cutting and lack of any management measures is prevalent in the valley. It is recommended that immediate steps should be taken in implementing aggressive and effective program for accelerated restoration, and that it should be based on participatory and integrated approach of different agencies, otherwise, continuing with business as usual will result in further deterioration of the natural forest cover in the valley.

Introduction

Present literature portrays (Humphreys, 2006) unprecedented rates of decline and degradation in the natural forest areas. McDermott *et al.* (2009) points out that the global research identifies broad trends of decline in forest with little emphasis on specific situation. In this work we are concentrating on the decline in the status of the widespread subtropical scrub forest of Pakistan which was documented in detail by Champion *et al.* (1965) and Parker (1915). Gorrie (1946) also reported that in the provinces of Punjab and Khyber Pakhtun Khwah the degraded scrub stretches over an area of 10000 square miles and described the surviving remnants, as epitome of destruction caused by wrong use of land, according to him “they are far from the original primeval jungle which was destroyed”. In this work we have tried to focus on increasing trends of decline of this forest type in a specific location (Ahmad 2010) in an isolated Soan valley, depicting that even in this valley the natural environment has become overwhelmingly cultural. Soan valley is located in district Khushab, Pakistan and is isolated as it is surrounded by hills of about 400m to 1527m height above sea level. It falls within the subtropical region with a cover of dry subtropical broad leaved forest, with a bi-climax of *Olea ferruginea- Acacia modesta*. The climate of the valley is characterized by average precipitation of 600mm and average temperature is 1°C in January and 36°C June (Ahmad, 2010). The data from Ahmad (2010) was further statistically analyzed in a study (Khan *et al.* 2012) in which intact groves were selected as benchmarks and three degraded states were identified in terms of deviation from the supposed natural state. The work was conducted in three public forests and the results showed that Hayatul Mir (HM), with an area of 1646.55 hectares has 24% of area under intact forest, most of it is located in the core area, the rest of the forest is in various stages of degradation. Khura West (KW) comprising of 351.93 hectares has 11 % of intact forest mostly in the core area. Khura North (KN) comprised of 186.71, with no intact forest (Fig. 1). This rapid ranking method especially designed to evaluate the extent of their degradation clearly shows that dynamics of the system is predominantly governed by the activity of humans and the invasion of mesquite. A part from the direct relationship of the small size of the forest and the increasing trends of degradation there is no other evidence as to how to relate the various stages of degradation to anthropogenic activities. Since anthropogenic disturbances have lead to deterioration of this fragile ecosystem therefore more knowledge of the nature and extent of disturbance would be essential to maintain quality productive and protective services to the inhabitants while planning to restore them back to their natural state. In this paper an attempt is made to relate the increasing trends of degradation of the forest by analyzing the underlying trends of the purchase and sale of wood dealers in the entire valley and also specifically gathering information on grazing and mining activities in the three public forests, which have shown increasing trends of degradation. It was hoped that this study would provide much needed information to devise management plans to address the increasing trends of degradation of the natural forest and also to improve better collaboration across sectors for management of natural forest in the valley.

Methods

In order to evaluate the anthropogenic effects the following two activities were targeted.

- i). Questionnaire based survey to monitor the activity of the local wood dealers in the entire Soan valley to roughly estimate the amount of wood extracted from the valley. In addition, other information related with

the price of the wood and details of the purchasers was also collected.

ii) The information on grazing and mining activities in the three forests (HM, KW, KN), which were previously selected to develop a rapid ranking method for evaluation of extent of degradation in these forests (Khan *et al.*, 2012), was compiled from the revenue records of the three forests. In addition, information on old practices of forest management recommended for the forest type (Gorrie, 1946) like rotation and forest closings were gathered by interviewing forest guards and rangers in the three forests.

Results

The results of the information obtained from the interviews is compiled and discussed under the following headings

Extent of extraction of wood by the wood dealers in the valley: The bulk of the wood dealers are located in district headquarter Naushera, it is centrally located and is connected with a good road network with cities outside the valley. Market survey reveals that 5 million kg per year of wood was purchased by traders in the valley; the bulk was that of *A. modesta*, followed by *O. ferruginea* and *Zizyphus jujube* (Fig. 2). Calculations from the seventeen wood dealers revealed that roughly, Rs. 5 million kg worth of wood was available in the market every year (Table 1). The results showed that *A. modesta* is the most bought and sold wood. The average rate of purchase and sale of the *O. ferruginea* is slightly higher than that of the *A. modesta* (Rs. 200 and 180 per 40kg. respectively). It appears that higher amount of the wood of *A. modesta* in the local market is due to the fact that it dominates the slopes of most of the forest as compared to the *O. ferruginea* which occupies more specialized niche on northern slopes and higher elevations. The questionnaire from the wood dealers also revealed that 65 percent of the wood was sold locally and 35 percent was exported to other cities across the province, the wood traders buy the wood from private farms, although there is indication that some of it comes from public forest but none of them would admit it openly as all of them were aware of the fact that there is ban on wood cutting and they would be liable to legal action by the forest department. It is pity that large amount of wood is being exported in spite of the fact that there is at the moment ban on cutting of wood for the conservation of these fragile natural forest resources.

Trends of grazing, mining and management practices in the public forests of the valley: The revenue records show that the overall number of livestock, in the HM has doubled as compared to the other two forests which have shown gradual decline (Table 2). This also corresponds to status of the three forests, In KN, it could be because it has no intact patches left and most of it is in a highly degraded state (Fig. 3), as compared to KW is less degraded as compared to KN, whereas HM still has larger proportion of intact patches of forest as compared to the other two (Fig. 4). By adding both cattle with half and full grazing fee in all three forests, we have total livestock equal to 11749. Out of which 7065 number of cattle was allowed at payment of half and full rate of grazing fee in HM and 4684 number of cattle in KN and KW as per Government Notification No. 670 dated 23.12.1897 (Table 3).

But that does not justify allowing more grazing, as there are additional pressures on HM. It is in the form resident laborers and accompanied livestock involved in mining activities and additionally the forest is under the sway of mesquite invasion and some degraded portions have assumed the form of monoculture of mesquite (Fig. 5). It is expected that these activities will further decrease the grazing potential of the forest in future. In order to maintain particular attributes at optimum level in the degraded forest, the intact forest patches in the core area of HM, should be given a protective status and the degraded forests should adopt the traditional management practices in order to restore them to that desirable state.

The five coal mines were present only in the HM forest, with 27417 tons per year production, and a proper road network in the forest for the transport of the coal to the nearest market. The five mines have approximately 231 laborers and 74 cattle heads. Both species *O. ferruginea* and *A. modesta* are extensively used for heating and cooking purposes by the workers. Although Mining licenses are supposedly revised with strict binding and continuous monitoring by the forest managers, but huge heaps of mining debris and degraded patches of forest in the adjacent areas clearly suggests that more efficient monitoring would be required (Fig. 6). Additionally, new laws should be made for mining companies as it should be binding, that rehabilitation expenses have to be paid by the mine owners and also make them liable to pay fine or fee for the damage caused by associated labour and livestock.

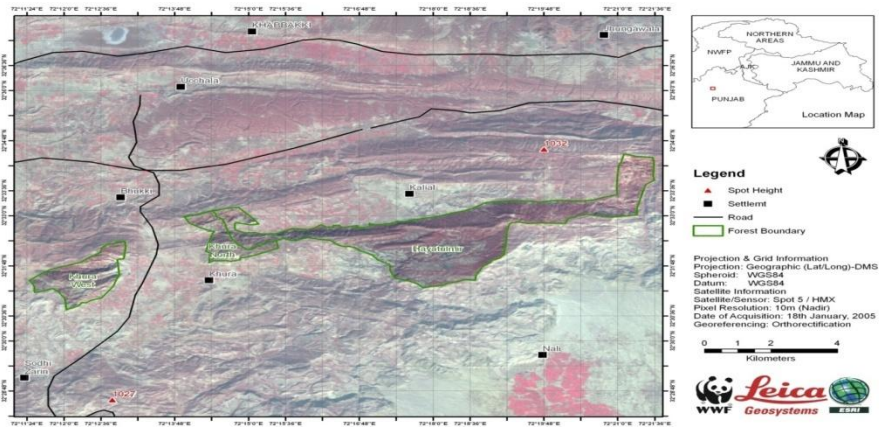


Fig. 1. Satellite Data Used With Overlaid Forest Boundary



Fig. 2. Firewood Stacks in Wooden Toll near Study Area

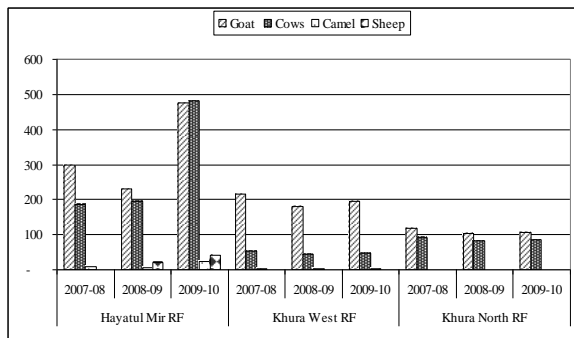


Fig. 3. Number of Livestock and Tenure of Grazing in the Study Area.



Fig. 4. Goats browsing trees of *Acacia modesta*



Fig. 5. *Prosopis juliflora* (light green) Invasion in Core Area of Hayatul Mir.



Fig. 6. Working Coal Mine in Hayatul Mir Reserved Forest.

Table 1. Purchase and sale of wood (mounds per month) by the local wood dealers in Soan valley.

Name (Place)	<i>Olea feruginea</i>		<i>Acacia modesta</i>		<i>Zizyphus jujuba</i>		Others		Total	
	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale	Purchase	Sale
1 Muhammad Farooq (Nausher a)	290	150	530	150	300	250	50 Eucalyptus	50 Eucalyptus	1,170	600
2 Umar Hayat (Dh aka)	100	80	250	200	100	80	-	-	400	440
3 Hazrat Gul (Nausher a)	200	120	600	480	100	90	75 Tecomela	50 Tecomela	975	690
4 Lal Khan (Nausher a)	200	150	500	430	100	80	-	-	800	660
5 Mulazim Hussain (Nausher a)	130	80	200	150	80	80	-	-	410	310
6 Amir Abdullah (Nausher a)	170	110	390	280	110	100	-	-	770	570
7 Sultan Khan (Nausher a)	70	30	350	280	-	-	200 Mesquite	160 Mesquite	620	470
8 Khuda Bukhsh (Nausher a)	190	150	320	275	-	-	-	-	510	425
9 Skin dar Hayat (Ugali)	250	180	650	520	60	40	-	-	960	740
10 Amanullah (Ugali)	80	60	230	170	-	-	-	-	310	230
11 Muhammad Iqbal (Khabeki)	150	80	400	380	-	-	-	-	550	460
12 Ghulam Mohammad (Mardwal)	-	-	200	200	-	-	-	-	200	200
13 Malik Mohammad Iqbal (Hardosodhi)	-	-	780	500	290	190	-	-	1,070	690
14 Mohammad Mansab (Hardosodhi)	-	-	250	230	200	150	-	-	450	380
15 Shah Jahan Khan (Nausher a)	150	135	350	300	-	-	-	-	500	430
16 Mohammad Riaz Bhatti (Nausher a)	120	100	450	420	-	-	-	-	570	520
17 Rustam Khan (Uchali)	100	80	320	300	120	100	-	-	540	480
Grand Total	2,200	1,500	6,770	5,265	1,460	1,090	325	260	10,955	8,165

Table 2. Number of animals allowed to graze in the three public forests from 2007-2010, and number of coal mines and associated animals in the forest (the information was derived from the record books of the forest department).

No	Forest	Year	Number of Goats and other			Mining Activity		
			Goats	Others	Total No. of Animals	Number of Mines	Production (Tons per Year)	No. of Animals
1	Hayatul Mir	2007-08	299	197	496	5	27417	73
		2008-09	232	222	454	5	27417	84
		2009-10	476	547	1023	5	27417	76
2	Khura North	2007-08	117	93	210	-	-	-
		2008-09	102	83	185	-	-	-
		2009-10	105	87	192	-	-	-
3	Khura West	2007-08	216	57	273	-	-	-
		2008-09	181	45	226	-	-	-
		2009-10	195	48	243	-	-	-

Table 3. Tenure of Grazing at Full and Half Rates in the Study Area

S. #	Livestock	At half rate of grazing fee						At full rate of grazing fee								G. Total livestock at half and full rates	% age of G. Total livestock at half and full rates		
		In Hayatul Mir RF			In Khura RF	Total livestock at half rate	%age of live stock type at half rate	In Hayatul Mir RF					In Khura RF		Total livestock at full rate			%age of livestock type at full rate	
		Naushera	Bhukki	Total				Naushera	Bhukki	Kalial	Kandaan	Total	%age	Khura					%age
1	Goat	-	-	-	-	-	-	951	488	620	160	2,219	58	1,254	35	3,473	47	3,473	29.6 %
2	Cows	1,796	542	2,338	812	3,150	73	413	-	444	159	1,016	26	1,179	33	2,195	29	5,345	45.5 %
3	Camel	-	-	-	-	-	-	-	-	-	-	-	-	7	0	7	0	7	0.1 %
4	Sheep	572	154	726	233	959	22	-	-	404	62	466	12	1,064	29	1,530	21	2,489	21.2 %
5	Buffaloes	141	20	161	29	190	4	-	-	62	13	75	2	-	-	75	1	265	2.3 %
6	Horses & Donkeys	-	-	-	-	-	-	-	52	-	12	64	2	106	3	170	2	170	1.4 %
Total		2,509	716	3,225	1,074	4,299	100	1,364	540	1,530	406	3,840	100	3,610	100	7,450	100	11,749	100 %

* Government Notification No. 670 dated 23.12.1897

Table 4. Market Value of Grazing of Livestock in the Study Area *

S. #	Livestock	Hayatul Mir RF				Khura North RF				Khura West RF				All Forests		Rate of Animal Units	Total Animal Units	Rate of Dry Forage/ Fodder Per Kg. (Rs.)	Total Amount per Day (Rs)
		2007-08	2008-09	2009-10	Total	2007-08	2008-09	2009-10	Total	2007-08	2008-09	2009-10	Total	G. Total	%age				
1	Goat	299	232	476	1,007	117	102	105	324	216	181	195	592	1,923	58	0.20	128.20	18.00	20,768.40
2	Cows	187	196	483	866	93	83	87	263	54	43	46	143	1,272	39	1.00	424.00	18.00	68,688.00
3	Camel	10	6	23	39	-	-	-	-	3	2	2	7	46	1	1.70	26.07	18.00	4,222.80
4	Sheep	-	20	41	61	-	-	-	-	-	-	-	-	61	2	0.15	3.05	18.00	494.10
5	Buffaloes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.20	-	18.00	-
6	Donkey, Horses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.50	-	18.00	-
	Total	496	454	1,023	1,973	210	185	192	587	273	226	243	742	3,302	100	-	581.32	18.00	94,173.84

* One animal unit can graze over nine kilogram (9 kg) of dry fodder/ forage in one day and the lowest rate of dry fodder in market was Rs. 18.00 per kilogram.

Discussion

It appears that the degraded status of the forest is closely linked with the prevailing human activities and it suggests that the forest are bound to decline in the absence of any management practices to halt the declining state of forest in the private, community land and the public forest. These trends are leading to accelerated loss of a permanently productive asset on this fragile landscape. It appears that the patches of intact forests, depicting the desired state, are mainly surviving on Government controlled reserved forests but they too are in various stages of degradation, whereas the private and community owned grazing land have destroyed the entire cover of trees and have rendered the land useless for forestry or for any other purpose. The study also identified the extent of man induced pressures in the public forest which in the private and community land is unlimited, especially, permission to mine coal, salt, silica and limestone which has directly and also indirectly, like construction of roads for transportation of minerals has exposed remote forest areas for exploitation and accelerated erosion. In the past the grazing on public forest land was controlled when it interfered with the management or regeneration of the forest tree crop. Reintroducing past management practices in these forests (Gorrie, 1946) based on short rotations can give better chance for rested areas to produce palatable species for a larger head of stock. But unfortunately it has not been practiced for decades even in the protected forest areas. There was also a 10 or more years of closure practiced for regeneration; as the least time required for the common scrub forest species to take root and grow out of danger from goats and cattle. In addition, afforestation in these areas was carried out by reseeding suitable species on contour trenches, troughs, pits, bunds, and behind check dams for arresting soil erosion, induce seepage and check denudation. Similarly there was 30 years recommended closures in coppice felling working circle (GOP, 1989). It was recommended for recovery of over lopped and coppiced trees on the basis of suitable exploitable diameter stumps of *A. modesta*, and *O. ferruginea*, the aim was to provide much needed long rest for rehabilitation. Unfortunately forest closure and other relevant activities have never been practiced in the public forest of the area. These practices if reintroduced would certainly bring better eventual revenue, than the present grazing rates (permit) of two rupees per sheep and eight rupees per cow, goat, donkey, mule and horse per annum and can also discourage frequent and unlimited grazing in these fragile forest resources (Table 4).

Elsewhere in the community forest, land open to grazing and in unclassified forest no attempts at control has ever been made, even traditional closure to give some respite during the rains is never practiced, with the result that the sheer weight of round the year grazing does not allow enough time for the grass and shrubs to seed and regenerate themselves. This has made it an almost treeless landscape dominated by shrubs which are unpalatable to the goat, whereas most of this could be economically productive and of much greater value for soil and water conservation, if it were not entirely sacrificed to grazing and browsing. These areas could have been made more productive if they were classified according to that use which is of major importance, namely, protection for water catchments, fuel shelter belts with rotational grazing or a combination of management practices recommended for the forest type.

A recent study (Khan *et al.*, 2011) on the restoration of indigenous forest in the area revealed that the traditional practices of closure would result in regeneration, invasive mesquite (both species, *Prosopis juliflora* and *Prosopis grandiflora*) instead of native species; emphasizing new supplementary initiatives based on accelerated restoration techniques for rehabilitation of degraded forest. If urgent steps are not taken to control the mesquite invasion even the highly ranked 'bench mark' forest will gradually assume the form of low ranked forest, which will not be able to provide any protective or productive services to the landscape. In addition there are no plans for its control or eradication in spite of the fact that the entire valley seems to be under its sway and has overwhelmed the native species of great cultural and ethnobotanical significance (Khan, 2010b; Irshad *et al.*, 2008) resulting in loss of biodiversity, and a serious threat to the integrity of natural scrub forest of the valley.

Various departments working for land development in the valley, like the agriculture, veterinary, forestry, revenue department and more recently several NGO's working for sustainable development and wildlife conservation in the valley have their own limited sphere of work. There is an urgent need to pay greater attention to promote possibilities of developing networking of organization, because a great many mistakes have been made in the past by allowing promotion of a single use of the area which has masked and destroyed the natural resources. Currently the commodity program of most of these organizations is to benefit cash crop production and grazing, and farmers have an incentive to convert to cash crops or grazing highly erodible land that otherwise would have been part of the program for conservation of the natural vegetation of the valley for providing ecosystem services that could have embarked the society on a course of ecologically sustainable development. These critical areas require holistic approaches to ensure stability and sustainability as undesirable trends can still be reversed if policy makers act in a coherent and timely manner. This important dimension of integration can only be achieved by an agreement providing for coordination of the activities of the all the agencies working in these areas and undertaking

joint research training and implementation activities (Khan, 2003).

A recent study (Khan, 2010a) in the fragile land suggested that forest carbon stores under remnants of natural vegetation are threatened by human induced stresses in the form of both reduced forest acreage and reduced carbon density. The present trends of over-consumption of these natural resources at an accelerated pace has not only eroded the entire valley's economic base but also debilitated its life support ecosystems, and unfortunately, at the moment there is no realization that these resources, if sustainably used, could enhance protective and productive capacity of the area.

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