

## **Land Use Pattern in Dal-Dachigam Catchment**

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### **ABSTRACT**

Dal-Dachigam (34° , 04' to 34° , 14' N longitude and 74° , 48' to 75° , 85'E latitude) representing one of the side valleys of Kashmir valley proper. Dachigam National Park alone represents an area with rich biodiversity. The catchment is inhabited by about thirty four villages which include fourteen villages located in the outskirts and twenty villages with a human population of 21,542 individuals situated along the main drainage tributaries. The catchment encompasses an area of about 221km<sup>2</sup>, the major portion of which 141km<sup>2</sup> lies within Dachigam national Park. Agriculture and horticulture are the two major activities in the villages of the catchment and pasturing cattle which is taken up as a supplementary occupation here and assumes significance on the higher lush green pasture slopes / alpine meadows of upper Dachigam. In view of Dachigam catchment representing a major portion of hydrological and precipitational catchment for the famous Dal lake the present land use survey was carried out.

**Keywords:** Catchment, erosion, landuse, national park, quarrying.

### **INTRODUCTION**

Land use refers to man's activities and various uses carried on land, which are utilitarian in nature. Land use can be defined as "use of land by man usually with the emphasis on its prime role in the economic activities (Cambell 1987). The word "use" is interpreted in a broader dimension which includes both land improvements and land degradations. According to Lee(2000), "Best land use is the use of land that produces the most benefits to society". Land use studies are generally expressed as land use of the area and the site. Such studies also include the present and the past use of the land. Land use pattern is indicative of the interaction, usually complex in nature, between society and environment. Land utilization has a lot of variations due to complex environmental and human conditions. Ecologists and Geographers are giving due credit and emphasis to the understanding of the complex combination of factors that affect land use. As a matter of fact, land use study has emerged as one of the frontline sectors of modern ecology. In a country like India, where much of the land resources are spread over in villages, it is basically important to know the present or existing use of land in order to plan for its optimum use. A rational assessment of land and its utilization has become a necessary pre-requisite to analyse

the nature and process of socio-economic changes of the region, Dal-Dachigam catchment, on which the present contribution is based, is ecologically important because it forms the major watershed for the famous Dal lake. The area is also important because of the fact that major part of it is still not much disturbed anthropogenically and existing as famous Dachigam national park. Also, in the catchment a considerable contrast among a variety of landuse patterns prevails.

## MATERIAL AND METHODS

The data presented in this paper and related to various aspects of landuse viz., human habitation, agriculture, horticulture, livestock and erosion / siltation in the catchment was simply obtained from various concerned government and semi-governmental agencies. The data was carefully analysed, compiled and interpreted.

## RESULTS

Dal-Dachigam catchment is inhabited by about thirty four villages. Besides fourteen villages located in the outskirts, about twenty villages are situated along the main drainage tributaries. Some of the major parameters of the land use in the villages of the catchment are presented in Table 1 and Table 2.

The twenty villages of the catchment (Table 1), on the whole occupy an area of 2304.40 hectares, there are 3246 house-holds, the human population is 21,542, the area under irrigation is 949.26 hectares and the cropped area is 1408.40 hectares.

The thirty four villages of the catchment (Table 2), in totality have an irrigated area of 1020.00 hectares while 706.78 hectares of land is devoid of irrigation facility. Paddy (*Oryza sativa*) is the chief cultivated food crop. Besides cultivation of maize (*Zea mays*), mustard (*Brassica oleraceae*), Oats (*Avena sativa*), fodder pulses and vegetables is also being practised.

The major horticultural plantations in the catchment area apple (*Pyrus malus*), cherry (*Prunus avium*) and walnut (*Juglans regia*). The minor plantations include pear (*Pyrus communis*), grapes (*Vitis vinifera*), almond (*Prunus amygdalus*), peach (*Prunus persica*), plum (*Prunus domestica*), apricot (*Prunus armenica*) and sweet chestnut (*Castanea sativa*). About 2308.90 hectare area is covered by orchard lands of thirty four villages of the catchment (Table 3). New Theed has the highest number of farm operating families (340) and also the highest land holding area (120.32 hectares), as is indicated in Table 4.

The pesticides and fungicides commonly used in the catchment include

Table 1. Land use data (1998-99) of twenty villages of Dal-Dachigam catchment

S. No.	Name of the Village	Number of House Holds	Area according to village paper (Hectare) (Hectares)	Area Irrigated (Hectare)	Percent Irrigated	Cropped Area	Percent Cropped Area	Population on (1998-99)		Total (1998-99) Population
								Male	Female	
01.	Barji	88	40.00	20.00	50.00	30.00	75.00	298	264	562
02.	Batapora (A)	149	115.80	44.40	38.34	83.20	71.84	435	453	888
03.	Batapora (B)	144	115.80	44.40	38.34	83.20	71.84	434	453	887
04.	Burzhama	48	130.00	80.00	61.53	90.00	69.23	157	132	289
05.	Chaterahama	350	371.60	98.80	26.58	187.60	50.48	1211	1180	2391
06.	Danihama	72	173.60	66.00	38.01	86.00	49.53	208	217	425
07.	Dara	349	133.60	104.00	77.84	108.00	80.83	1137	1009	2146
08.	Fagir Gujri	324	133.60	25.20	18.86	83.20	62.27	1143	943	2086
09.	Gasso	258	106.40	71.60	67.29	84.00	78.96	453	435	888
10.	Inderhama	52	32.00	19.20	60.00	26.40	82.50	142	126	268
11.	Khumber	228	348.40	99.26	28.49	187.20	53.73	914	864	1778
12.	Mufi Bagh	60	36.40	19.60	53.84	20.40	55.04	174	146	320
13.	Mullaq	31	9.60	7.60	79.16	8.00	83.33	85	73	158
14.	Murenor Bagh	43	242.80	129.60	53.37	147.20	60.62	138	127	265
15.	New Theed (A)	400	N.A.	N.A.	N.A.	N.A.	N.A.	2001	1733	3734
16.	New Theed (B)	310	N.A.	N.A.	N.A.	N.A.	N.A.	1420	1222	2642
17.	Saidapora	160	121.20	59.60	49.17	*73.60	60.72	379	359	738
18.	Takya Shangrihi	30	74.80	1.60	2.13	22.00	29.40	106	74	180
19.	Wanihama	122	76.40	42.00	54.97	64.00	83.76	360	343	703
20.	Yenal	28	42.40	16.40	38.67	24.40	57.54	102	92	194
Total	20	3,245	2,304.40	949.26	46.47	1408.40	61.11	11,207	10255	21,542

N.A. : Not Available

**Table 2. Farm operating and landholding families in thirty four villages of Dal-Dachigam catchment.**

S.No.	Name of the Village	Farm Operating Families	Land Holding (Hectares)
1.	Arabai	115	41.40
2.	Asthan Pora	67	22.50
3.	Barji (A & B) + Gundtal	97	30.00
4.	Burzahama	66	46.60
5.	Chand Pora	68	15.00
6.	Chaterahama	158	136.30
7.	Check Dara	105	30.00
8.	Danger Pora	104	85.20
9.	Danihama	71	40.05
10.	Dara	152	60.00
11.	Darda Khower	86	30.15
12.	Faqir Gujri	269	100.00
13.	Ghaso	121	72.50
14.	Gund Telbal	60	14.27
15.	Harwan	170	72.41
16.	Inderhama	55	28.45
17.	Kashie Pora	98	38.05
18.	Khimber	117	80.65
19.	Khimber	NA	109.14
20.	Khug bagh	106	16.15
21.	Mufti bagh	65	20.00
22.	Mulnar	44	18.00
23.	Mulphaq	196	70.00
24.	Murender bagh	109	32.02
25.	Nagbal + Marg	68	50.00
26.	New Theed	340	120.32
27.	Pazal Pora	68	46.35
28.	Saidpora	140	75.02
29.	Shoper bagh	97	45.75
30.	Takia Sangrashie	30	33.75
31.	Wadi mohalla	35	36.65
32.	Wangund	289	25.32
33.	Wanihama	79	51.60
34.	Yehal	35	28.20

NA : Not Available

Table 3. Area under different crops in thirty-four villages of the Dal-Dachigam catchment

S.No.	Number and name of the village	Irrigated Area (Hectares)	Unirrigated Total Area (Hectares)	Paddy	Maize	Mustard	Oats	Fodder	Pulses	Vegetables	Orchard
1	<b>4 villages:</b> Chandpora, Harwan Munar, and New Theod	140.73	225.73	125.60	25.00	100.60	25.00	4.00	2.00	15.13	50.00
2	<b>5 villages:</b> Ghasoo, Inderhama Khimber, Takia Sangreshie and Wanhama	143.30	272.95	125.40	45.00	109.60	16.40	9.00	1.00	17.90	76.90
3	<b>5 villages:</b> Arabel, Ashan Pora, Danger Pora, Kashi Pora and Pazar Pora	190.70	233.40	150.55	4.50	80.00	30.00	2.00	1.00	40.15	38.20
4	<b>4 villages:</b> Gund Telbal, Khimber, Khug Bagh and Wangund	94.88	164.68	75.94	30.00	60.00	15.00	6.00	3.00	18.94	40.00
5	<b>villages:</b> Bari (A and B) +Gundial, Check-e-Dara, Dara, Darda Khower, Fagir Guji, Mufti Bagh and Naghal + Mang	102.42	320.15	88.35	120.00	50.30	38.05	20.00	2.00	14.07	46.74
6	<b>4 villages:</b> Danhama, Muiphaq Muender Bagh and Saidapora	164.09	217.09	131.03	15.00	80.00	51.03	10.00	3.00	33.05	26.04
7	<b>5 villages:</b> Borzahama, Chaterhama, Shoper Bagh Wadi mohallah and Yehal	184.60	293.50	155.75	36.00	100.00	55.75	12.00	3.00	29.00	60.00
	<b>Total</b>	1020.00	1727.70	852.62	275.50	579.30	231.23	63.00	15.00	168.25	341.88

**Table 4. Estimates of utilization of pesticides, fungicides and fertilizers in the thirty-four villages of the Dal-Dachigam catchment for the year 2000-2001.**

S. No.	Name of the Village	Area under Orchards (Hectares)	Name of the Pesticides and Fungicides used:	Total Quantity in Litres		Name of the Fertilizers	Total Quantity of Fertilizers in Kilograms
01.	Baba Gh, Din	48.8	Diesel Oil, Dimethoate, Mencozeb, Fungarimol, Hexoxozole, Endosulphan	535.8		Urea, Di-amino Phosphate, M.O.P*	732
02.	Barjee	45.4	-do-	499.4		-do-	681
03.	Biran	124.4	-do-	1366.4		-do-	1866
04.	Burzahama	14.6	-do-	160.6		-do-	219
05.	Chatterhama	176.4	-do-	1840.4		-do-	2646
06.	Chock-e-Dara	39.3	-do-	432.3		-do-	589.5
07.	Cheshmashi	77.2	-do-	849.2		-do-	1158
08.	Danihama	58.4	-do-	642.4		-do-	876
09.	Danpora	79.2	-do-	871.2		-do-	1188
10.	Dara	47.6	-do-	523.6		-do-	714
11.	Darbagh	73.6	-do-	809.6		-do-	1104
12.	Dard Khovar	24.2	-do-	266.2		-do-	363
13.	Gandial	9.3	-do-	103.3		-do-	139.5
14.	Gasso	30.2	-do-	332.2		-do-	453
15.	Gupf Ganga	60.8	-do-	668.8		-do-	912
16.	Inderhama	7.6	-do-	83.6		-do-	114
17.	Lam	21.6	-do-	237.6		-do-	324
18.	Manzgam	84.4	-do-	928.4		-do-	1266
19.	Meerak Abad	40.6	-do-	435.6		-do-	609
20.	Multi Bagh	11.2	-do-	123.2		-do-	168

Continued

Contd. Table 4.

21.	Munar	83.2	--do--	915.2	--do--	1248
22.	Mulphiaq	12.4	--do--	136.4	--do--	186
23.	Nagbal	36.2	--do--	398.3	--do--	543
24.	New Theed	455.8	--do--	5013.8	--do--	6837
25.	Nishat	64.4	--do--	709.4	--do--	966
26.	Pazal Pora	10.0	--do--	110.0	--do--	150
27.	Phaloo	110.4	--do--	1214.4	--do--	1656
28.	Saidpora Balla	81.8	--do--	1009.8	--do--	1377
29.	Saidpora Paain	153.6	--do--	4689.6	--do--	2304
30.	Shalikhud	78.8	--do--	866.8	--do--	1182
31.	Shoper Bagh	21.9	--do--	240.9	--do--	328.5
32.	Tailbal	42.4	--do--	466.4	--do--	636
33.	Wadi Mohalla	51.0	--do--	561.0	--do--	765
34.	Yehal	22.2	--do--	244.2	--do--	333
	Total	2308.9 Hectares		5642 Gallons		76263.3 Pounds

M. O. P. \* Mulexite orthophosphate

**Table 5. Some of the parameters of live-stock (excluding sheep and goat) of twenty eight villages of the Dal-Dachigam catchment.**

S. No.	Number and name of the villages	Live-stock population				Average milk production per day	Number of poultry farms	Bird population	Average egg production
		Cows	Bulls	Buffaloes	Horses				
1	5 villages: Bargi, Dargah, Muhar, Muhi Bagh and New Theod	1039	15	X	7	42 litres	3	580	475 per day
2	7 villages: Asthan Pura, Check e-Dara, Dara, Dhanda Khower, Gundtal, Nagabal and Saldapora	678	35	12	20	19 litres	3	300	250 per day
3	1 village: Faqir Gujn	914	30	14	35	399 litres	Nil	500	250 per day
4	15 villages: Arbal, Dew mohallah, Dosi mohallah, Hundum mohallah, Harwan, Ishibeer Kumar mohallah, Leskhar mohallah, Lone mohallah, Matto mohallah, Meerakabad, Okhen mohallah, Puzal pora, Sharti mohallah and Sofl mohalla	1108	45	X	12	76 litres	5	5000	3000 per day



Endosulphan, Funarimol, Dimethoate, Hexoconazole, Mencozeb and Diesel oil. Overall 25,389 litres (5642 gallons) of these agrochemicals were used in the orchard lands of thirty four villages during the year 2000-2001 (Table 3).

Besides the sheepyard and farmyard manures, the commonly used major chemical fertilizers include Urea, Diamino Phosphate (DAP), Muleate orthophosphate (MOP) and Potassium nitrate. The total consumption of the chemical fertilizers in the orchard lands of the thirty four villages during 2000-2001 was approximately 38,132 kilograms. The live-stock (excluding sheep and goat) of the twenty eight villages of the catchment comprises of 3964 animals (Table 5) with cows forming the bulk and numbering 3739, the remaining being represented by bulls, buffaloes and horses. The poultry bird population stands at 6380.

There exists a government sheep breeding farm well inside the official boundary of the National Park occupying an area of 4.5 sq. Km. The farm was established in the year 1961 (22-06-1961), with a foundation stock of 441 animals. The objective of the farm is to produce fine wool, hybrid rams for distribution among the field organizations for upgrading of local sheep stock. The cross-bred-sheep have higher body weight and higher wool yield of better and finer quality. The ultimate aim is being an improvement in the economic status of the sheep rearers. Some of the achievements of the farm are highlighted in the Table 6.

**Table 6. Achievements till date(1999 – 2000) of the sheep breeding farm Dachigam.**

S. No	01	02	03	04	05
	Foundation Stock	Receipts from other sources	Total transfers/ distributors	Live-stock strength as on 31-03-2000	Wool produced so far
01	441 animals	2939 animals	12,157 animals	1202 animals	1,21,434.570 Kg.

The average monthly silt (tonnes per hectare) carried by Dachigam stream during the year 2000 (Table 7) was 0.0387, for Dara and Tailbal streams this parameter was estimated as being 0.0219 and 0.6064 respectively for the same period. Further, silt load on Tailbal stream appeared to be comparatively higher during the months of March and April (early spring).

**Table 7. Monthly silt (tonnes / hectares) carried by three different tributaries draining Dachigam catchment during the year 2000.**

S.No	Stream	March	April	May	June	July	August	September	October	Av. Silt per month
1.	Dachigam	0.0589	0.0600	0.1023	0.0030	0.0068	0.0012	-	-	0.0387
2.	Dara	0.0366	0.0273	0.0306	0.0018	0.0111	0.0310	-	-	0.0219
3.	Talibal	1.7980	1.3800	0.9362	0.2010	0.3193	0.0888	0.0960	0.0341	0.6064

## DISCUSSION

The data in Table 1 shows that Chaterahama has the highest land area of 371.60 hectares and Mulfaq, the lowest of 7.60 hectares. Of the twenty villages, eleven which have land area in excess of 100 hectares include: Chaterahama (371.60 hectares), Khimber (348.40 hectares), Murender bagh (242.80 hectares), Danihama (173.60 hectares), Dara (133.60 hectares), Faqir Gujri (133.60), Burzhama (130.00 hectares) Saidapora (121.20 hectares), Batapora A (115.80 hectares), Batapora B (115.80 hectares) and Gasso (106.40 hectares).

The area under irrigation, in percent terms, for the twenty villages is 46.47 and the cropped areas is 61.11. Obviously the cropped area exceeds the area for which irrigation facility is available.

Murender bagh has the privilege of having the highest area (129.60 hectares) under irrigation and Takya-Sangrishi, the lowest of 1.60 hectares. However, Mulfaq has the status of having the highest percentage of 79.16 (of its total land area) under irrigation. The highest cropped area of 107.60 hectares lies with Chaterahama and the lowest area of 8 hectares under crops is for Mulfaq.

Wanihama with 83.76% of its land area under crops leads in so far as the percent cropped area for each of the twenty villages is considered, the village Takya-Sangrishi has the lowest of 29.40% land area under crops.

Nine villages which have 50% or above of their land area under irrigation include: Burzhama, Wanihama, Gasso, Inderhama, Mulfaq, Dara, Barji, Murender bagh and Mufti bagh. The cropped area for each of these villages is also in excess of 50 percent. It is note worthy here that Faqir Gujri has 62.27 percent of its land area under crops. This is so despite the fact that this village presently has only 0.86-percent land area under irrigation.

Analysis of the data presented in Table 3 reveals that in the thirty four villages of

the catchment with a total land area of 1727.70 hectares, the highest of 852.62 hectares of land is under paddy cultivation followed by mustard (579.30 hectares) and maize (275.50 hectares). The lowest of 15.00 hectares is under the cultivation of pulses.

Only in the case of a group of seven villages of Barji + Gundtal, Check Dara, Dara, Darda Khower, Faqir Gujri, Mufti Bagh, Nagbal + Marg, the area under maize cultivation (120.00 hectares) is in excess of the land area under the cultivation of paddy (88.35 hectares).

Fodder cultivation for domestic live-stock which is spread over 63.00 hectares, indicates that agri-pastoral activity is also given due consideration by farmers in the catchment area.

Besides agriculture, horticulture and live-stock rearing, other noteworthy landuse activities apparently visible in Dal-Dachigam catchment include:

i) Overgrazing ii) Deforestation and timber cutting (presently mostly confined to the buffer zone outside the official boundary of the national park), iii) Fuel wood harvesting, iv) Commercial quarrying, v) Land damage by soil erosion, and vi) Forest and Grassland.

The degraded grazing pastureland, which was designated as one of the study sites for the present research investigation appeared to be under serious / intense grazing pressure. This moderately sloppy area is situated some three kilometers from Brain Nishat. Several decades of grazing and that too beyond the carrying capacity has resulted in the creation of denuded and semi-denuded patches and consequently signs of erosion are apparent. This observation is similar to those made by Bhat *et al.* (2002) as regards the human interfered temperate and alpine pasturelands of Dachigam national Park. Pasturelands require to be changed to a protective land use such as complete fencing as a remedial measure to allow its natural recovery / self-regeneration and increase productivity. Further reseeded with quick growing native plant species desired / preferred by live-stock would restrict soil erosion and consequently help in stabilization of this sloppy rangeland. However, it is an irony that the problem of serious denudation here has arrested the attention of the concerned govt. agencies.

A substantial part of this moderately sloppy pastureland has fast turned into a barren area of stone excavations. Locally called as Astanpora and the hills as Baba Gulam Din Sahib, the area at present abounds at least six to eight stone excavating (quarry sites) operating under the supervision of various construction groups. As per

rough estimates everyday six to eight truckloads of stone are excavated from these sites. Records indicate that quarrying in the area has been going on since 1980 or even earlier. Quarrying has turned the area barren defaced & degraded it as also placed it at a serious risk of soil erosion and future land slides. Further it appears that the quarrying sites are polluting the waters of Dal Lake by carrying lost material through the streams flowing down the slope & have degraded the quality of life for people living in the vicinity. The tragic aspect of this ongoing episode is that the concerned agencies / departments such as the district administration and the Department of Wildlife are watching the situation like silent spectators least concerned of the consequences of their omissions and commissions.

With reference to overgrazing in the catchment it is worth to mention here that even in upper Dachigam the nomadic hill people or Gujjars as they are called, bring thousands of sheep, goats and even buffaloes during late spring and summer months to feed on the lush high pastures of upper Dachigam. It appears that the traditionally important grazing sites in this high altitude zone are also under moderate to high grazing pressure and probably suffer from erosion, though this aspect was not personally investigated. It is worth to mention here that studies carried out by Dr. Fred Kurt who studied the hangul in Dachigam for several years revealed that the presence of the Banjaries, Bakarwals & Gujjars, with their herds of live stock in upper Dachigam had a seriously deleterious effect on this traditionally important grazing habitat of hangul.

The local inhabitants in the buffer zone of Dachigam encroach on the park mainly for fuel wood (as a minor forest product for cooking and coal) and biomass removal as fodder for cattle. However, petrolling by the wild life department keeps off poachers and removers of forest produce to a minimum. Besides this, the hill people or Gujjars have a desperate need for forest products to sustain their livelihood. The forest provides this nomadic community grazing land and cut fodder for their animals and fuel for cooking and heating.

The prolonged period of dry spell prior to and during the period of the research study appeared to have jeopardized the water resource systems of the catchment area. Except for the brief monsoon spell during the summer of 2000, the streams and tributaries draining the catchment such as Dachigam and Telbal appeared to have become sluggish with low level of water and more or less reduced to thin trickles for most part of the year.

As mentioned earlier drought like conditions prevailed in the catchment area during the study period. This not only had triggered the onset of early autumnization but

also put the Dachigam National Park at more risk of forest fires with several confirmed reports of deliberate and accidental fire occurrences during the dry spell.

Dachigam sheep breeding farm as mentioned earlier appears to be playing an important role in producing hybrid rams in its efforts to bring improvement in the economy of local sheep rearers. The cross-bred sheep have higher body weight, yield wool better in terms of both quality and quantity, and are well suited to the alpine conditions. It is worth to mention here that field extension programmes by this agency must be given a boost to generate awareness amongst the migratory shepherds (Gujjars) and locals of the benefits of domestication of hybrid sheep and cattle stock to encourage them to adopt (practise) the same. Breeding improvement will ultimately enable the available pasturage in the catchment area to be put to optimum use by keeping a lesser number of better sheep and by increasing the production of meat and wool.

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