

**Short communication**

**Extreme temperature events over Kullu Valley**

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One of the anticipated effects of climate change is the possible increase in both frequency and intensity of extreme weather events such as hurricanes, floods, droughts, heat waves, cold waves, tropical cyclones & tidal waves and severe storms (De et al, 2005). The global warming is expected to be accompanied by changes in temperature and precipitation extremes. Kuster (1993) concludes that there has been an increase in forests of Himachal Pradesh whereas Gupta (1990) warns of the impending total deforestation of the very same area, shows lack of reliable data. There is no doubt that the consequences of increased population and his activities have some negative impact on the Himalaya in general and on Kullu valley in particular. Micro and meso-scale differences in climate, geology, vegetation and human land use all play a role in determining the extent to which human activity affects natural climatic processes.

On the left bank of the river Beas Kullu is an ancient town of Himachal Pradesh which finds a mention in the religious texts as ‘Kulantpitha’ means ‘the end of the habitable world’ which seems appropriate as beyond Kullu,

there are only the high Himalayas. The north-south trending Kullu valley located in the transition zone between the greater Himalaya (Rohtang) to the north and the lesser Himalaya (Hansu) to the south. Daily meteorological data available for substantial period from 1994-2009 at Seobag (32°N, 77°E and 1350 m amsl) and from 1962-2009 at Katrain (32°N, 77°E and 1550 m amsl) were collected and analyzed for climatic variability.

**Trend in temperature**

Extreme weather is observed in Kullu valley during the winter (December to February) when the temperature usually goes down to freezing point. During this season the average day temperature is 14.7°C and the night temperature was 2.1 degree Celsius. The variability in both the maximum and minimum temperatures is increasing from south to the north direction but, from winter to summer in maximum temperature and from summer to winter in minimum temperature (Table 1).

**Cold waves**

In Kullu valley the occurrence of cold waves

**Table 1:** Seasonal and monthly analysis of temperatures.

Month	Seobag				Katrain			
	T - max		T- min		T- max		T -min	
	Mean	CV%	Mean	CV%	Mean	CV%	Mean	CV%
/Seasons								
March	21.8	14.7	5.2	26.9	16.6	17.0	5.5	33.6
April	26.1	11.8	8.8	20.5	21.5	8.9	9.1	20.0
May	28.6	8.7	11.9	15.9	25.3	8.5	12.1	15.7
Summer	25.5	10.5	8.6	16.3	21.2	7.7	8.9	17.2
June	30.9	5.5	16.3	7.9	27.9	4.8	16.1	9.5
July	30.5	7.5	19.0	7.3	27.1	4.7	18.5	8.4
August	30.1	3.6	18.9	3.1	26.7	5.6	18.3	8.0
Sept	29.4	4.7	15.5	10.3	26.0	5.4	14.7	11.3
SWM	30.2	3.9	17.4	4.6	26.9	3.8	16.9	7.9
October	26.5	9.8	9.0	12.2	23.0	8.1	10.2	57.3
November	22.6	9.2	4.6	36.9	18.5	8.7	5.3	35.6
Post-M	24.6	8.9	6.8	20.6	20.8	7.5	7.8	41.0
December	18.4	7.6	1.9	105.4	14.1	1.9	2.8	48.6
January	14.7	14.9	1.1	100.2	11.0	1.7	1.4	116.4
February	17.2	16.3	2.8	50.3	12.8	2.3	2.6	73.1
Winter	16.8	8.3	1.9	52.2	12.6	1.2	2.3	62.2
Annual	24.7	3.3	9.6	7.3	19.9	4.6	9.7	14.6

**Table 2:** Numbers of cold waves at Seobag

Epochs	November (Temp °C)		December (Temp °C)		January (Temp °C)		February (Temp °C)	
	2 to 0	0 to -4	2 to 0	0 to -4	2 to 0	0 to -4	2 to 0	0 to -4
1992-94	21	-	64	-	53	-	32	-
1995-97	4	-	46	-	46	-	27	-
1998-2k	6	-	44	13	37	-	29	2
2001-03	11	4	45	12	58	23	40	1
2004-06	10	3	45	29	47	21	19	10
2007-08	12	-	30	9	18	28	17	5

**Table 3:** Numbers of heat waves (>32 °C) at Seobag

Epochs	May	June	July	August	September
1992-94	8	29	15	2	0
1995-97	9	31	2	1	0
1998-2k	25	25	24	13	0
2001-03	5	42	47	49	2
2004-06	31	36	40	17	0
2007-08	14	16	7	3	0

(considered here when minimum temperature below zero) is a normal feature under the influence of snow storms during winter. From 1990 the lowest temperature recorded at Seobag was 3.1°C below zero on 2<sup>nd</sup> February, 2008. There were good numbers of days having cold waves during 1992 to 1994 in all the four winter months after that more fluctuation was observed in the minimum temperature (Table 2). All the four months are showing a decreasing trend of the occurrence of cold waves but also showing an increasing in days having more negative temperature.

#### Heat waves

When the daily maximum temperature of more than five consecutive days exceeds the normal average maximum temperature by 5 °C then it is known as a heat wave. Severe heat waves have caused catastrophic crop failures, forest fires and hyperthermia. The rising maximum temperature during the pre-monsoon months often continues till June, even in rare cases till July over the northwestern parts of India. Similar trend in heat waves was observed in Kullu

valley (Table 3). Highest numbers of heat waves were observed in the month of June which is the warmest month in Kullu valley. Till date the highest day temperature of 37.5°C at Seobag was recorded on 26 July, 2004 and 21 June, 2005, the years which also received the more numbers of heat waves.

#### REFERENCES

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