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An Air Quality Assessment of Haldwani City of Uttarakhand

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Abstract— Air is very important for the survival of human beings. But the rapid industrialisation, increase in no of vehicles, construction work, deforestation increasing level of pollutants in air it degrade air quality. The present study is about the air quality assessment of Haldwani city of Uttarakhand observing PM10,SPM, SO_2 and NO_2 data of year 2018. The PM10 and SPM value is more then permissible limit but the value of SO_2 and NO_2 within the limit.

Keyword— Air Quality, Haldwani, CPCB, NO_x

I. INTRODUCTION

Haldwani is located in the state of Uttarakhand at 29.22°N latitude 79.52°E longitude in the Nainital district on the right bank of the Gaula River and being situated in the immediate foothills of Kumaon Himalayas. Haldwani is the second most populous city, the largest commercial market in the Indian state Uttarakhand. The air quality is generally described as a combination of the physical and chemical characteristics that make air a healthful resource for human, animal and plants. Air pollutants can directly affect flora and fauna. In urban areas vehicular emission is main reasons of air quality problems. SOx, NOx, COx are produced by vehicles. SPM,PM10,PM2.5 contaminants produced by construction dust and other human made activities. Industrial pollutant also affect the quality of air. The polluted air can cause a serious health problems.

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II. METHODOLOGY

Study sites

The study site is air quality measuring instrument present in government hospital Haldwani.

A. Permissible limits

According to Central Pollution Control Board (CPCB) the current National Ambient Air Quality Standards were notified on 18 November 2009 are follows

Table 1: National Ambient Air Quality Standards by CPCB

Pollutant	Annual	24 hours
PM10	60	100
SPM	40	60
NO_2	40	80
SO_2	50	80

III. OBSERVATION

12 month data of 2018 different air quality parameters follows:

Table II: Observation table of different month of 2018

	PM10(µg/m³)	SPM(µg/m³)	SO_2(µg/m³)	NO_2(µg/m³)
Jan	129.89	206.95	11.66	23.79
Feb	130.37	213.22	11.69	23.67
Mar	132.27	219.3	11.73	23.7
April	131.22	216.6	11.69	23.74
May	128.48	212.86	11.9	23.36
June	128.14	208.83	11.61	23.3
July	125.28	196.92	11.33	23.01
Aug	119.34	188.63	11.35	22.42
Sept.	124.71	191.15	11.64	22.85
Oct.	123.8	189.91	11.03	21.42
Nov.	119.23	186.08	12.3	22.06
Dec.	118.37	185.37	8.65	21.99

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IV. RESULTS

We can draw following results from the above observation table:

A. PM10

PM10 value lie between 118.37 µg/m³ to 132.27 µg/m³. The highest value observed is 132.27 µg/m³ in month of march and lowest value observed 118.37 µg/m³ in month of December.
The permissible limit for PM10 in annual basis is 60 µg/m³. The value of PM10 is above the permissible limit it means air pollution is observed due to PM10 partials.

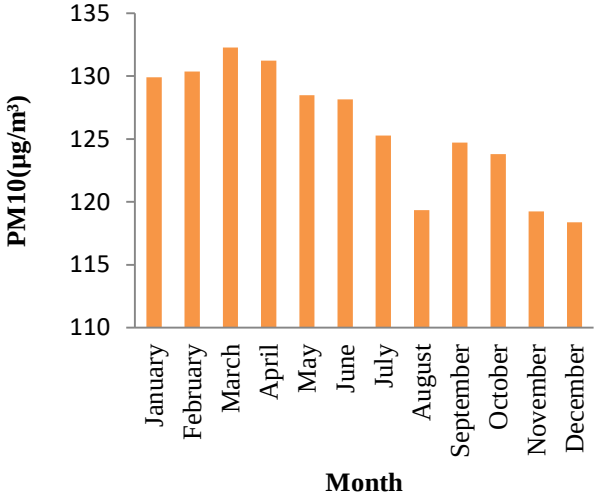

Figure 1 : PM10 values in Haldwani 12 month of 2018

B. SPM

SPM value lie between 185.37 to 219.3 µg/m³ µg/m³. The highest value observed is 219.3 µg/m³ in month of march and lowest value observed 185.37 µg/m³ in month of december.
The permissible limit for SPM in annual basis is 40 µg/m³. The value of SPM is above the permissible limit it means air pollution is observed due to SPM partials.

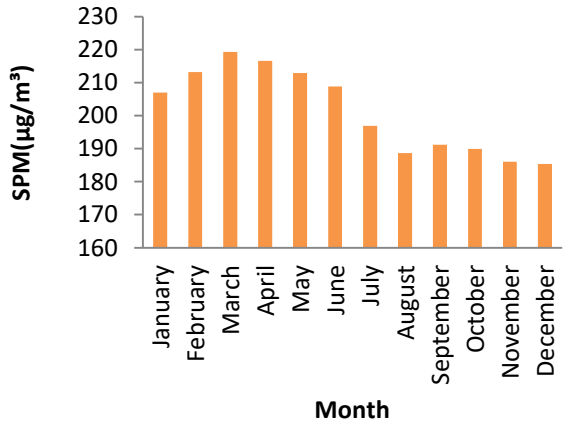

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Figure 2: SPM values in Haldwani 12 month of 2018

C. SO_2

SO_2 value lie between to 8.65µg/m³ to 12.3µg/m³. The highest value observed is 12.3 µg/m³ in month of november and lowest value observed 8.65 µg/m³ in month of december.
The permissible limit for SO_2 in annual basis is 50 µg/m³. The value of SO_2 is within permissible limit it means air pollution is not observed due to SO_2 partials.

Figure 3: SO_2 values in Haldwani 12 month of 2018

D. NO_2

NO_2 value lie between 21.42 µg/m³ to 23.79 µg/m³. The highest value observed is 23.79 µg/m³ in month of january and lowest value observed 21.42 µg/m³ in month of october.
The permissible limit for NO_2 in annual basis is 40 µg/m³. The value of NO_2 is within permissible limit it means air pollution is not observed due to NO_2 partials.

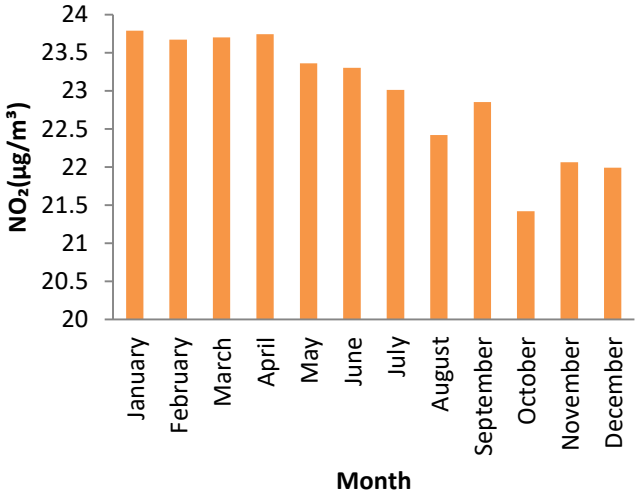

Figure 4 : NO_2 values in Haldwani 12 month of 2018

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V. CONCLUSION AND FUTURE SCOPE

According to this study we reached at conclusion that the overall quality of air in Haldwani is in the acceptable limit of CPCB norms but not very good for health of children and elderly peoples. Due to many industrial plants in the city they affect the quality of air in city. We can do study of areas which are affected by air pollution and getting for the solution to reduce it.

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