A CASE STUDY OF AIR POLLUTANTS OF PUNE CITY

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INTRODUCTION

Air pollution occurs when harmful or excessive quantities of substances including gases, particulates, and biological molecules are introduced into Earth's atmosphere. Though there are many different chemicals in air pollution, this lesson will focus on the six most common types: **lead**, nitrogen oxide, **ozone**, **particulate matter**, **carbon dioxide**, and sulphur dioxides. These can be in the form of solids, liquids, or gases. PM10 is **Particulate Matter of 10** Microns in diameter or smaller.

DATA DESCRIPTION

TIME SERIES DATA

AIR POLLUTION

ONE YEAR DATA

THREE AREAS OF PUNE CITY

THREE SEASONS

PM10 (Particulate matter (size < 10 micorns)

Pb content in PM10 [lead], Cd content in PM10 [cadmium], Cu content in PM10 [copper],Cr content in PM10 [chromium],Zn content in PM10 [zinc],Nox content in PM10 [Nitrogen oxide], SO2 content in PM10 [sulphur dioxide]

OBJECTIVES

TO CHECK DIFFERENCES ACROSS AREAS
TO SEE IF THERE'S ANY FLUCTUATIONS IN PM10 VALUES IN DIFFERENT SEASONS
TO STUDY VARIATION OF DIFFERENT METALS/GASES
TO SEE THE TREND IN PM10 VALUES FOR DIFFERENT SEASONS

METHOLODOGY

MULTIPLE LINEAR REGRESSION USING R SOFTWARE
ANOVA USING R SOFTWARE
GRAPHS USING EXCEL
DATA SORTING USING EXCEL
TIME SERIES ANALYSIS
TO FIT A MODEL FOR PM10 VALUES

ANALYSIS

MULTIPLE REGRESSION

Ho: overall model is not significant
H_1: overall model is significant

SEASONS	ADJUSTED R^2	P VALUE	CONCLUSION
SUMMER	0.8768	0.00015	Reject Ho
WINTER	0.6891	0.0033	Reject Ho
MONSOON	0.1172	0.01211	Reject Ho

CONCLUSION :

For summer season the model is significant.

For winter season the model is significant.

For monsoon season the model is significant.

ANOVA

SEASONS

H_O=change in season does not have a significant effect
H_1=change in season has a significant effect

AREAS

H_O=change in season does not have a significant effect
H_1=change in season has a significant effect

Pb	Significant	Not significant
Cd	Significant	Significant at 0.01
Cu	Significant	Significant at 0.01
Cr	Significant	Significant at 0.01
Zn	Significant	Significant at 0.01
Nox	Significant	Significant at 0.01
SO2	Significant	Significant at 0.01

CONCLUSION :

Seasons have significant effect on the levels of metals/gases viz Pb,Cd,Cu,Cr,Zn,No_x,SO_2 .

For lead(Pb) areas do not have a significant effect on the level.Areas have significant effect on the levels of metals/gases viz Cd,Cu,Cr,Zn,Nox,SO2 at 1% level of significance .

ANOVA FOR PM10 VALUES

Ho=change in season does not have a significant effect for seasons and areas

H_1=change in season has a significant effect similarly for seasons and areas

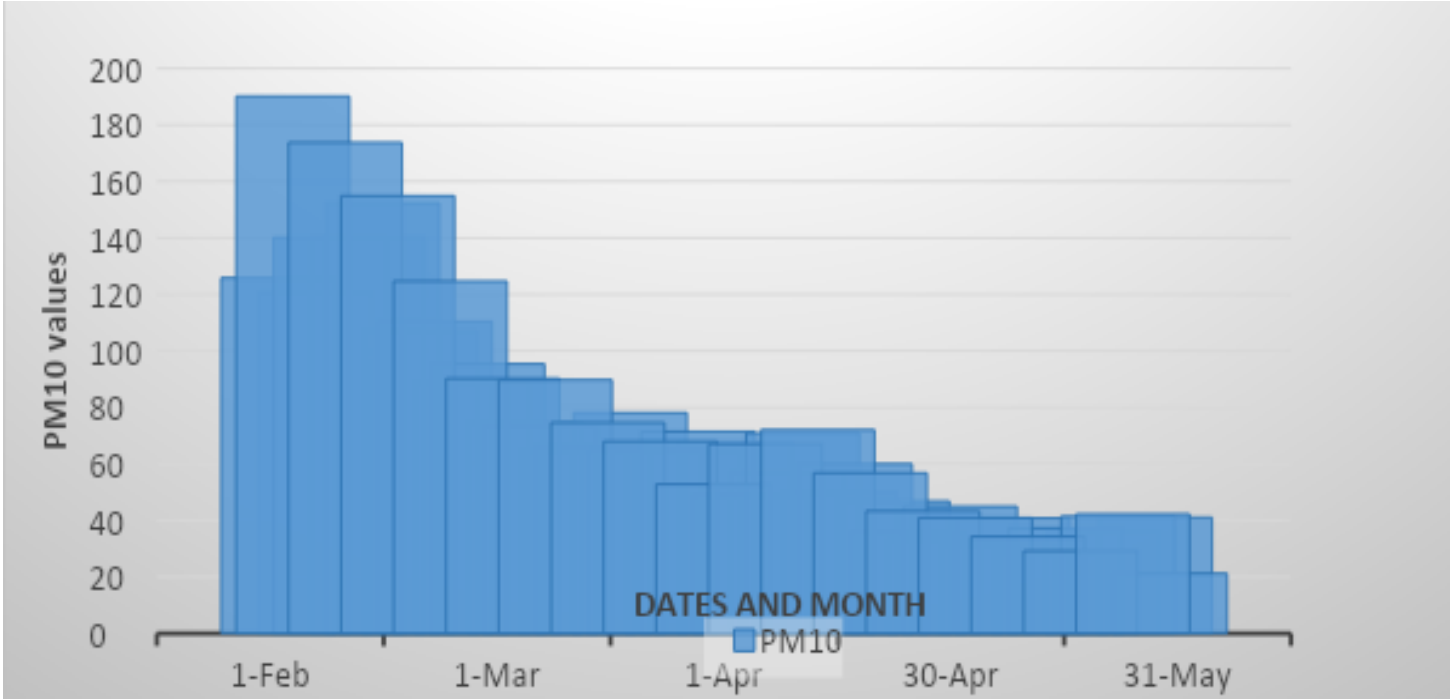
SOURCE	CONCLUDE	RESULT
SEASONS	SIGNIFICANT	REJECT Ho
AREAS	SIGNIFICANT	REJECT Ho

CONCLUSION:

Seasons have significant effect on the levels of PM10 values

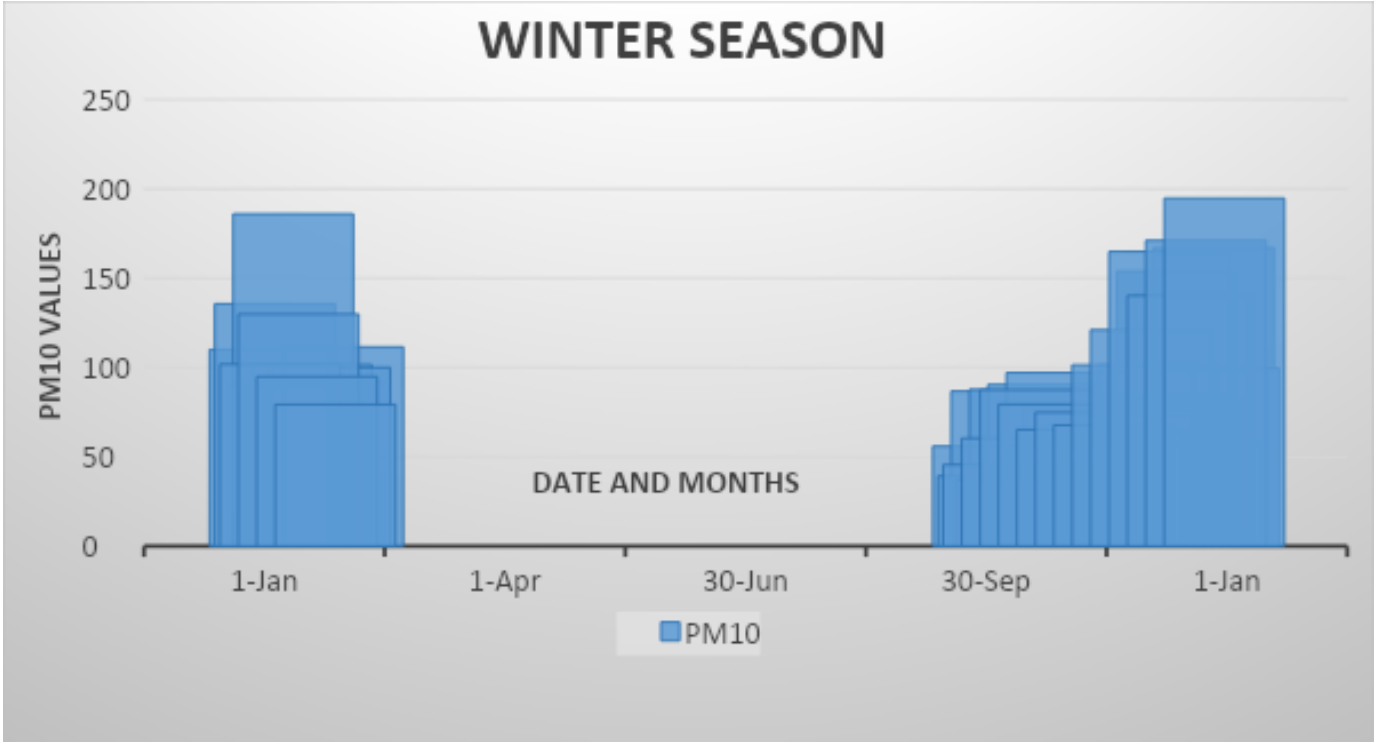
Areas have significant effect on the levels of PM10 values

GRAPHICAL ANALYSIS:



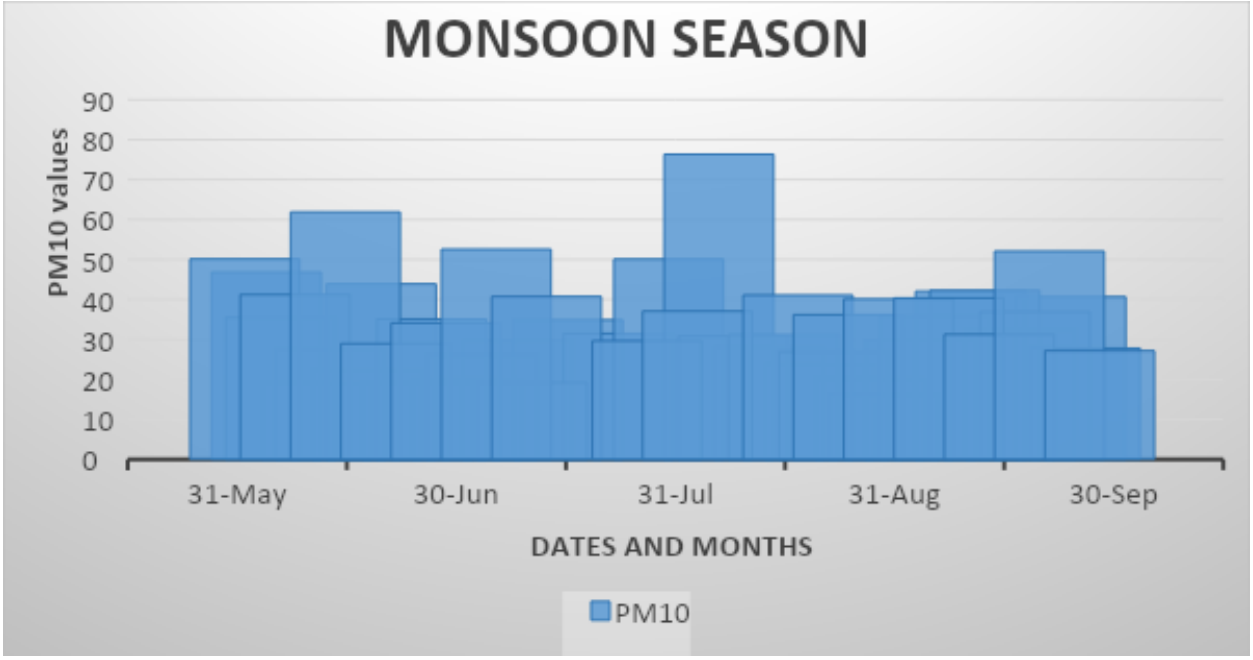
Conclusion:

For the summer season decreasing trend is observed in the PM10 values .



Conclusion:

For the winter season an increasing trend is observed in the PM10 values.



Conclusion:

For the monsoon season there is no trend observed in the PM10 values

Results:

OVERALL MODEL IS SIGNIFICANT FOR SEASONS

OVERALL MODEL IS SIGNIFICANT FOR AREAS

CHANGE IN SEASON HAS A SIGNIFICANT EFFECT ON PM10

CHANGE IN AREAS HAS A SIGNIFICANT EFFECT ON PM10

CHANGE IN SEASON HAVE A SIGNIFICANT EFFECT
ON METALS/GASES IN AREAS EXCEPT FOR (LEAD)