



Impact of Human Activity on Weather Climate of Ibrahimpatnam Mandal and Kondapalli Industrial Area of Krishna District - A Case Study

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Abstract: This paper is aimed at the study of the impact of human activities on air, water, soil and weather in Ibrahimpatnam mandal and Kondapalli industrial area of Krishna District. These were studied through simple experimental techniques like soil, water test, weather monitoring stations [WMS] and survey. The data was collected and analyzed by means of statistical tools. The observations were found to be alarming in Ibrahimpatnam and Kondapalli. The cloud albedo effect and the indirect effect are being increased due to the increase of aerosols. The Kondapalli toy makers are facing a shortage of the soft wood (Tellaponiki). The extinction of aquatic species is due to the temperature difference in the outlet of water released by the industries in to Krishna River. Ibrahimpatnam is becoming heat island and impacts of human activities are making it vulnerable. We suggest few solutions to improve the weather conditions and in turn for a better climate.

Keywords: Impact, Survey, Aerosols, Cloud Albedo Effect, Indirect Effect, Vulnerable and WMS.

Introduction:

Climate is the change in the weather conditions of a place over a long period of time. Whereas, weather is the average atmospheric condition of a place for a short period of time. Ever since the Industrial Revolution, there was a change in the climatic conditions. The glaciers all over the world started melting and the sea levels increased in height. There were a few areas which were affected by severe floods. On the other side there were even few places which were affected by droughts and famines. So, there is a severe loss in the context of human economy. The transportation sector also led to the climatic changes along with the industrialisation and led the natural disasters on rampage. Already 200 crores of the world's population are facing a lot of problems and probably humans would be the last organism to be extinct. Thus in this context we focused our study on industrialisation to give a few solutions to improve the weather conditions, so that better climatic conditions will prevail for the future generations through development. Development is not an increase in the economy of a country but the means of preserving the "Mother Earth".

Material and methods:

The two ways followed by us for a perfect study to do this project were:

- A. Survey and
- B. Experimentation

A. Survey: We started our project with a survey. In regards to our project, we had gone to few places in and around Ibrahimpatnam to study the impacts of human activities on the weather. Initially, we had gone to Andhra Pradesh Pollution Control Board (APPCB) to collect the information regarding the pollution caused by the industries. We also visited few industries like Rice Mill, Aqua industry, NTPS-Narla Tata Rao Thermal Power Station to observe the pollutants emitted into the surroundings. As transportation sector is the next major sector leads to 24% of the world's pollution after industrialization (56%), we had gone to the Road transport organization (RTO office). To study the impact of industrial waste water on the agricultural fields, we went to the Mandal Revenue Office (MRO office). Our survey also includes the interaction with Ferry (Fisherman community), Kondapalli village, Kondapalli toymakers, Kondapalli and Ibrahimpatnam grama panchayat who are the residents of Ibrahimpatnam and Kondapalli. The affect of the human activities in Ibrahimpatnam also led to the depletion of the kondapalli reserve forest. So, to get few details regarding the forest we went to the Divisional Forest Officer, Ibrahimpatnam, Krishna district, Andhra Pradesh. For the further clarification of our study we were guided by Professors and doctors, NARL-National Atmospheric Research Laboratory, Acharya Nagarjuna University-Environmental Science department and Andhra University.

B. Experimentation:

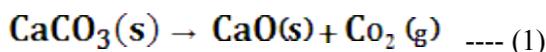
Water Test: According to the ISO standards the temperature of water released by the industries must be with +5 /-5 degrees Celsius difference in inlet and outlet water but we have found that the temperature of inlet water is 28 degrees and outlet water is 39 degrees at that instant which is 11⁰C more than inlet water. We checked the temperature of the water by using a mercury thermometer which has 0.1 accuracy.

Tri-Gas Experiment: The gases which are being evolved in large quantities from the Industrial area of Ibrahimpatnam are Carbon dioxide (CO₂), Methane (CH₄) and Nitrogen dioxide (CH₄). The Carbon dioxide, Methane and Nitrogen dioxide are the green house gases which have an impact on the weather and climate. So, we have conducted a simple experiment to know the increase in the temperature due to the absorption of heat by them and to understand their compounding effect.

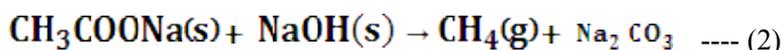
Aim: To prove that CO₂, CH₄, NO₂ increase in temperature due to absorption of heat which leads to the increase in global warming.

Apparatus: Thermometer, Tripod stand, Retort stand, Round bottomed flask-250ml , 100ml, Delivery tube, Rubber stopper, Chemicals, Candle, Electric bulb-100 watts.

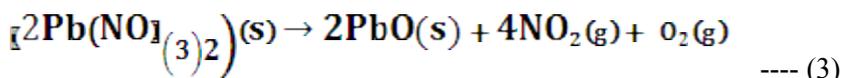
Procedure: The gases, CO₂, CH₄ and NO₂ are the main requirements to do this experiment. Thus, we have conducted few exothermic reactions to collect these gases into the round bottomed flasks and following are The Exothermic Reactions.



The thermal decomposition reaction (1) states that Calcium Carbonate gives rise to Carbon dioxide and Calcium oxide on supplying heat.



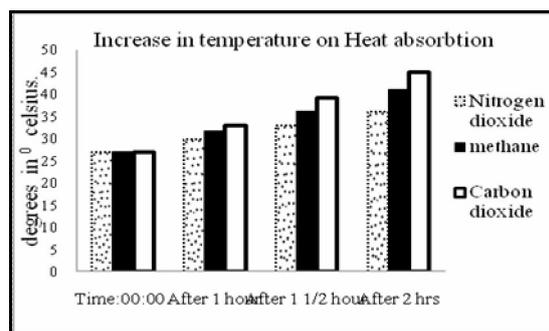
The thermal decomposition reaction (2) shows that Sodium Acetate was decomposed by the supply of heat to produce Methane and Sodium Carbonate.



The thermal decomposition reaction (3) shows that Lead Nitrate was decomposed by the supply of heat to produce Nitrogen Dioxide, Lead oxide and Oxygen. Thus, all the above reactions were used to produce the required gases and after collecting the gases into the flasks, we arranged them at equidistant from the bulb. We observed that there was an increase in the temperature in all gases due to heat absorption and heat is absorbed by CO₂ is more when compared with the other gases. The below table and graph1 show the rise in temperature of the gases due to the absorption of heat.

Table 1 Increase in temperature of different gases on absorbing heat

Gas	Initial temperature [in ⁰ Celsius]	Time [in hrs]		
		After 1 hour	After 1 hour 30 minutes	After 2 hours
CO ₂	27	33	39	45
CH ₄	27	31.6	36.2	41
NO ₂	27	29.8	32.8	36

**GRAPH 1**

Thus, in our atmosphere CO₂ is the gas which increases its temperature due to the absorption of heat and in turns it is responsible for the rise in global temperatures.

Results and discussion:

Data Analysis:

The data collected by us was analyzed using few statistical means such as means and percentages. This enabled us to prepare few tables and design the graphs which are as follows.

Table 2 Pollutant per Unit Power Generation

Type of the pollutant	Quantity of the pollutant
Carbon dioxide	800 gm
Sulphur dioxide	7 gm
Oxides of nitrogen	3.5 gm
Suspended particulates	0.4 gm
Ash	300 gm

Table 4 Humidity in Vijayawada

	Vijayawada	Ibrahimpatnam
January	14 ⁰ C	17 ⁰ C
February	24 ⁰ C	28 ⁰ C
March	26 ⁰ C	30 ⁰ C
April	29 ⁰ C	32 ⁰ C
May	31 ⁰ C	33 ⁰ C
June	33 ⁰ C	35 ⁰ C
July	30 ⁰ C	34 ⁰ C
August	29 ⁰ C	33 ⁰ C
September	28 ⁰ C	31 ⁰ C
October	27.5 ⁰ C	30 ⁰ C
November	32 ⁰ C	36 ⁰ C

Table 3 Temperature [monthly avg.] of Vijayawada and Ibrahimpatnam, 2014

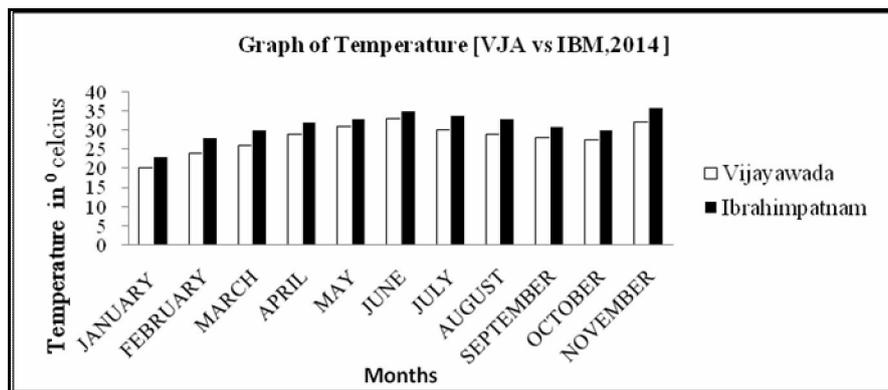
	Vijayawada	Ibrahimpatnam
January	12%	15%
February	76%	79%
March	81%	83%
April	74%	76%
May	77%	79%
June	58%	60%
July	75%	79%
August	80%	83%
September	81%	85%
October	83%	86%
November	86%	90%

Table 5. % rise of no. of people suffering with lung diseases in Ibrahimpatnam

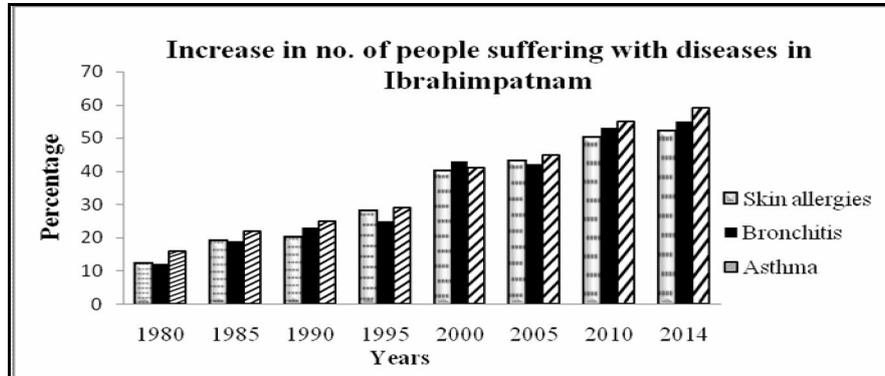
	Skin allergies	Bronchitis	Asthma
1980	12	12	16
1985	19	19	22
1990	20	23	25
1995	28	25	29
2000	40	43	41
2005	43	42	45
2010	50	53	55
2014	52	55	59

Table 6 Report of effluent discharge of the outlet water from the industries into river With respect to the above tables we had designed the following graphs:

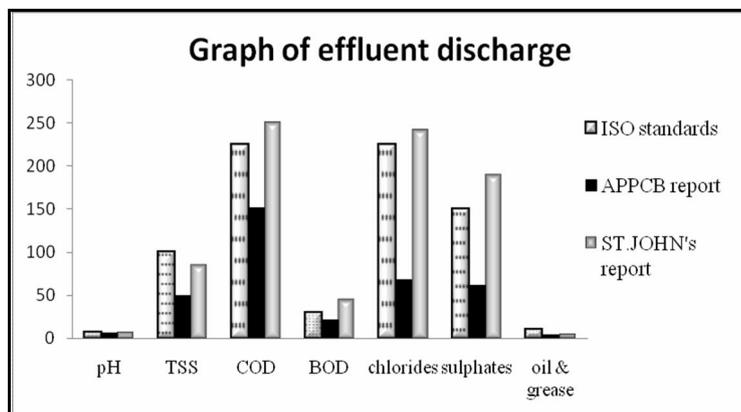
Sno.	Paramaters	ISO standards	APPCB report	St.John's report
1	pH value	7	6.92	8.1
2	Total suspended solids (mg/l)	100	50	86
3	Chemical oxygen demand (mg/l)	225	152	251
4	Bio chemical oxygen demand (mg/l)	30	22	46
5	chlorides	225	68	243
6	sulphates	150	62	190
7	Oil & grease	10	4	6



GRAPH 2 (Designed based on Table 3)



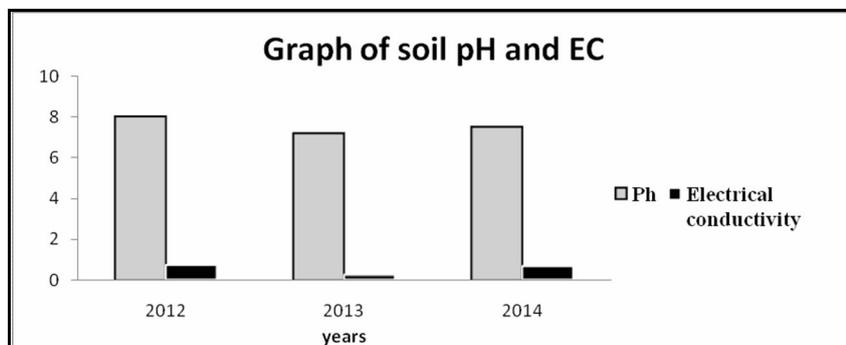
GRAPH 3 (Designed based on Table 5)



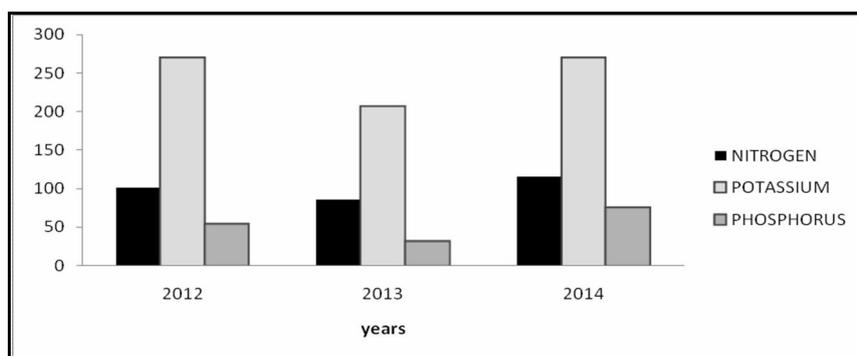
GRAPH 4 (Designed based on Table 6)

Table 7 Report of soil analysis in Ibrahimpatnam

YE R	pH	TYPE OF SOIL	Electrical conductivity	NITROGEN	POTASSIUM	PHOSPHORUS
2012	7.96	Clay	0.68	102	269	53
2013	7.15	Clay	0.25	86	206	31
2014	7.49	Clay	0.66	116	269	74



GRAPH 5: (Designed based on Table 7)



GRAPH 6 (Designed based on Table 7)

Interpretation:

Aerosols and their effect on Climate:

An Aerosol is a colloid of fine solid particles or liquid droplets, in air or another gas. Aerosols can influence climate by scattering light changing Earth’s reflectivity, they can also alter the climate through clouds. On a global scale, the “indirect effects” of aerosols typically work in opposition to the greenhouse gases and cause cooling.

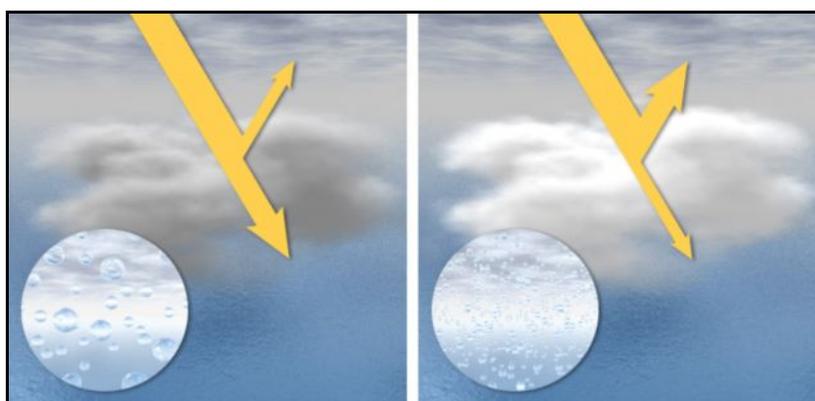


Fig. 1 Typical form of Aerosol

Indirect Effect & Cloud Albedo Effect:

Clouds in clean air are composed of a relatively small number of large droplets (left). As a consequence, the clouds are somewhat dark and translucent. In air with high concentrations of aerosols, water can easily condense on the particles, creating a large number of small droplets (right). These clouds are dense, very reflective, and bright white. This influence of aerosols on clouds is called the indirect effect. Brighter clouds, in turn, block sunlight from reaching the Earth's surface, shading the planet and producing net cooling. This cloud brightening effect, called the 'cloud albedo effect', may have a big impact on the climate.

The presence of bright and dark clouds above the industrial area of Ibrahimpatnam, changed the weather conditions of that area by adding sensitivity to the vulnerable climate and this is due to the industrialization. The black clouds are formed due to aerosols which contain SPM, dust particles etc., and this is leading to lack of sunlight and proper photosynthesis. We also interpret that this would be one of the reasons for great weather changes between Vijayawada and Kondapalli of Ibrahimpatnam.

The temperature in Ibrahimpatnam is gradually increasing due to the large amount of effluents that are being emitted because of various industries in Krishna district. Most of the GHGs are emitted from the industries. Ibrahimpatnam, having a national highway passing through it is getting more polluted because of the emissions of the SO_x and NO_x compounds. The development of industrialization in Ibrahimpatnam is good but it also has an impact on the weather due to urbanization and sanitation problems. Methane gas is evolved due to the stagnation of drainage water and burning of sugar cane fields as mentioned above. Also, the burning of the dung cakes evolves methane. The effect of other GHG's in a place like Ibrahimpatnam is making it as a heat island. The other human activities like transportation and urbanization are adding sensitivity to it and making it vulnerable.

Note:

Since climate is long term change in weather [almost 3 decades], we couldn't study much about it. Thus, we studied the weather conditions in Ibrahimpatnam as mentioned in the results and discussion basing on our weather study; we conclude that the climate in the following decades would turn adverse.

Conclusions:

Few solutions that we suggest are Usage of dust collectors, One day vehicle free day, using green vehicles, using solar vehicles, Usage of Public transport instead of individual transport, Maintenance of vehicles regularly. The usage of Gravitational settling chamber, Cyclonic separator and Scrubber can reduce the pollution caused by the industries to some extent. Climate Indicators should be set up in front of every industry to display the effluents released by that industry. Industries must follow ISO: 14001 act and must display the pollution standards of their industry day to day which must show all kinds of pollutants emitted from their industry. CSR funds must be allotted to the people who are facing the problems because of these industries in the Industrial area.

Mandal revenue offices of Andhra Pradesh must set up weather monitoring stations and data base 24/7 and must be connected with the national grid. Proper dumping of Industrial waste should be done to solve the problem of unfit soil, by the usage of good quality of coal air pollution can be controlled, Afforestation, Efficient E.S.P's to collect dust particles, Domestication of tellaponiki trees in barren lands should be done for the benefit of the Kondapalli toymakers. The temperature near the inlet and outlet must be less than 5 degrees Celsius. This can be done by installing cooling towers in thermal power plants.

Eco friendly practices restore degraded lands, relieve poverty and foster biodiversity. They bring back life to struggling rural villages and by reducing CO₂, they help in maintaining climate too. So, to create a culture of environmental responsibility across the nation, we shall put our efforts to go green and protect the green world which will in turn protect the future generations.

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