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## SUSTAINABLE PRACTICES FOR THE GREEN WORLD

**T. SRIKUMAR**

Department of Physics, Andhra Loyola College, Vijayawada-520008, A.P., India

**P.SRINIVAS, P.PARTHA KOUNDINYA**

St. John's (E.M) High School, Gunadala, Vijayawada-5

### ABSTRACT

This paper is aimed at the study of the impact of human activities on air, water, soil, and weather in Ibrahimpatnam mandal & 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.

**Key words:** impact, survey, Aerosols, Cloud Albedo Effect, Indirect Effect, Vulnerable, 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. The Inter-Governmental Panel on Climate Change (IPCC) was established by United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide the world with a clear view on the current state of Climate Change and its potential environmental and socio-economic consequences. IPCC defines climate change as 'a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or variability of its properties,[1-4] and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity'. The definition provided by UNFCCC is slightly different, as it emphasizes on 'a change that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods'.

Developing countries like India are under international pressure to sign a legally binding emissions treaty to avert catastrophic climatic change. Developing countries, however, have argued that any international agreement must be based on historic and per capita carbon emissions, with developed countries responsible for



reducing their emissions first and funding mitigation and adaptation in other countries. Recently, however, several scholars have argued that Indian government climate change discourses are shifting, primarily by recognizing the “co-benefits” of an alignment between its development and climate change objectives, and by displaying increasing “flexibility” on mitigation target. 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. 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. [5,6]. 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 impact of human activities on air, water, soil, and weather in Ibrahimpatnam mandal & Kondapalli industrial area of Krishna District, Andhra Pradesh, India. Few solutions were given to improve the weather conditions and in turn Better climatic conditions which prevail for the future generations. Industrial Development is not an increase in the economy of a country but the means of preserving the “Mother planet Earth” through sustainable practices.

### **Material and methods:**

This study was carried in two ways 1.Survey 2.Experimentation

#### **1. Survey**

The project was started with a survey using a structured questionnaire, for collection of data related to weather and climatic factors[6-8] from Andhra Pradesh Pollution Control Board (APPCB) regarding the pollution caused by the industries. And centres like Rice Mill, Aqua industry, NTTPS-Narla Tata Rao Thermal Power Station to observe the pollutants emitted into the surroundings. as The transportation sector is the next major sector leads to 24% of the world’s pollution after industrialisation (56%), the data also taken from the Road transport organisation (RTO office). To study the impact of industrial waste water on the agricultural fields, the Mandal Revenue Office was consulted (MRO office). This survey also includes the interaction with Fisherman community of Ferry an adjacent hamlet of river Krishna. Where they catch fish on daily basis, Kondapalli villagers, Kondapalli toymakers, Kondapalli and Ibrahimpatnam grama panchayat offices. The affect of the human activities in Ibrahimpatnam also led to the depletion of the kondapalli reserve forest. ,to get few details regarding the reserve forest status the Divisional Forest Officer, Ibrahimpatnam, Krishna district, Andhra Pradesh was consulted on selected issues for the study



## 2. Experimentation

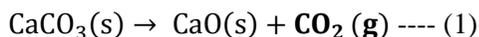
### Water Test

According to the ISO standards the temperature of water released by the industries must be with +5 or -5 degrees Celsius difference in inlet and outlet water but results found that the temperature collected at inlet of water is 28 degree Celsius and outlet of water is 39 degree Celsius for the canals supplying water and discharging water for the plant at the outlet point the temperature is 11<sup>0</sup>C more than inlet water.

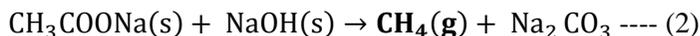
### Tri-Gas Experiment

The gases which are being evolved in large quantities from the Industrial area of Ibrahimpatnam are Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>) and Nitrogen dioxide (NO<sub>2</sub>). The Carbon dioxide, Methane and Nitrogen dioxide are the green house gases which have an impact on the weather and climate. So, To prove that CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>2</sub> increase in temperature due to absorption of heat which leads to the increase in global warming, the study was conducted with a simple experiment which also helps to understand their compounding effect.

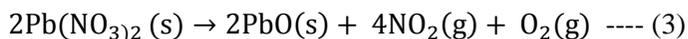
Few Exothermic Reactions were conducted to produce the gases CO<sub>2</sub>, CH<sub>4</sub> and NO<sub>2</sub> and those gases were collected into the round bottomed flasks.



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



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



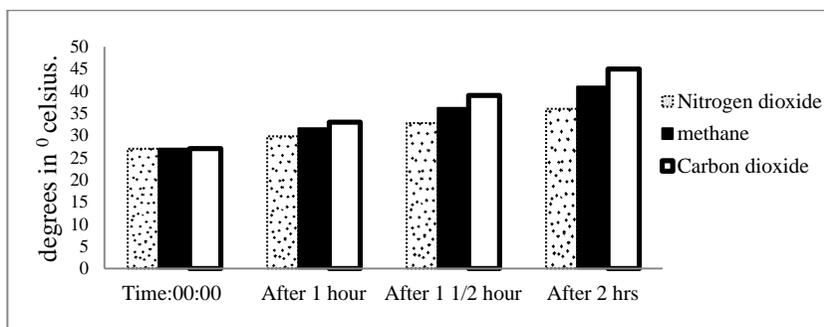
The above thermal decomposition reaction shows that Lead Nitrate was decomposed by the supply of heat to produce Nitrogen Dioxide, Lead oxide and Oxygen.

Thus, all the above reactions were used to produce the required gases and after collecting the gases into the flasks, the arrangement was done in such a way that all the three flasks are equidistant from the bulb. The observations from this experiment state that the gas "CO<sub>2</sub>" absorbed more heat and it increased in temperature. The below table and graph shows 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 ° Celsius]	TIME [in hrs]		
		After 1 hour	After 1 hour 30 minutes	After 2 hours
CO <sub>2</sub>	27	33	39	45
CH <sub>4</sub>	27	31.6	36.2	41
NO <sub>2</sub>	27	29.8	32.8	36



**Graph 1. Increase in temperature on Heat absorption**

Thus, in our atmosphere CO<sub>2</sub> is the gas which increases its temperature due to the absorption of heat and in turn it is responsible for the rise in global temperatures.

### **Results and discussion**

#### **Data Analysis**

The data collected was analyzed using few statistical means.[9-11] This enabled to prepare tables and to draw the graphs related various parameters related to pollutants, humidity and temperature, aerosols and effluent discharge from industries, percentage rise of number of people suffering with lung diseases in Ibrahimpatnam along with general environmental conditions experienced by the people in last three decades which includes rain fall, forest cover wild life habitat ,lightning thunders and deaths caused by it is found to increase alarmingly

**Table 2. Pollutant per Unit (g/Kwh) 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

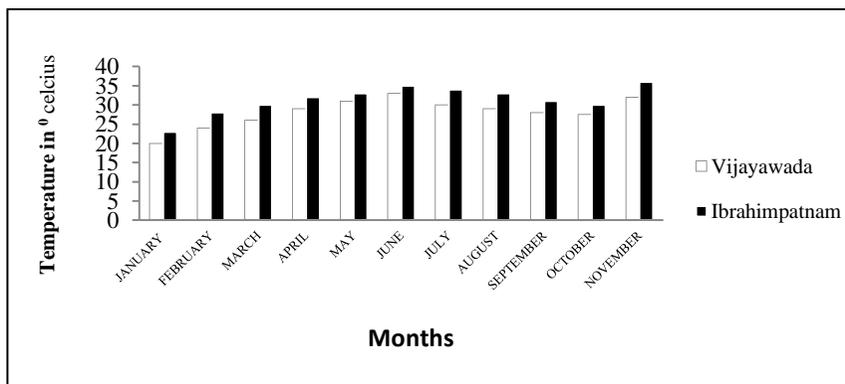


**Table 3: Fossil fuels share in carbon emission and energy generation**

Fuel	Share of energy generation (%)		Share of carbon emission (%)	
	India	World	India	World
Coal	55	20.3	69.78	41.2
Oil	30.5	41.3	26.31	42.65
Natural gas	7.0	21.1	3.9	16.12

**Table 4: Temperature [monthly avg.] of Vijayawada and Ibrahimpatnam, 2014**

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

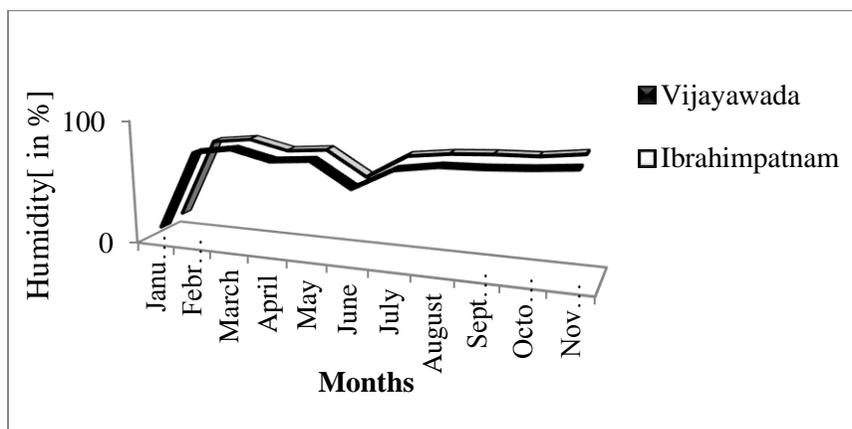


**Graph 4. Graph of Temperature [Vijayawada vs. Ibrahimpatnam, 2014]**



**Table 5. Humidity in Vijayawada and Ibrahimpatnam, 2014**

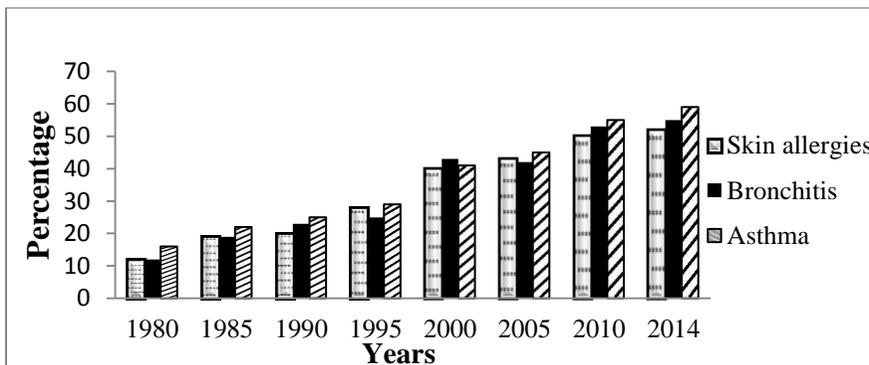
	<b>Vijayawada</b>	<b>Ibrahimpatnam</b>
January	12%	15%
February	76%	79%
March	81%	83%
April	74%	76%
May	77%	79%
June	58%	60%
July	75%	79%
August	80%	83%
September	81%	85%
October	83%	86%
November	86%	90%



**Graph 5. Effect of Humidity in Vijayawada and Ibrahimpatnam, 2014**

**Table 6: % rise of no. of people suffering with lung diseases in Ibrahimpatnam**

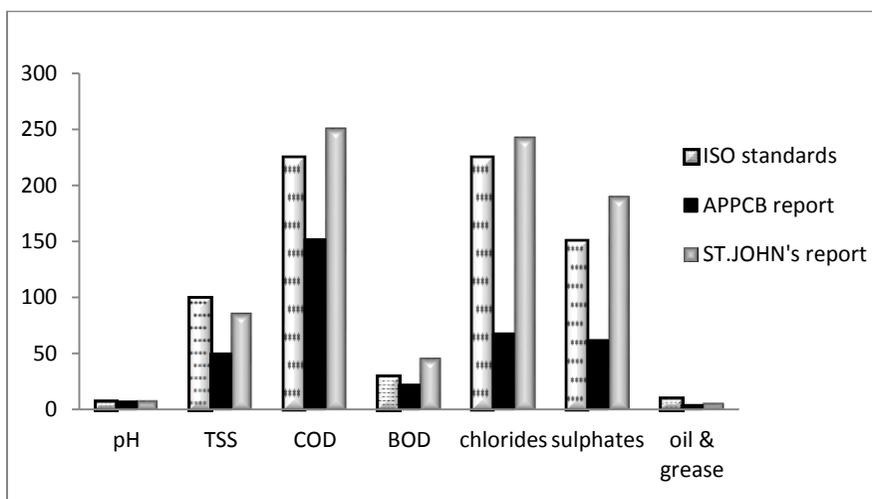
	<b>Skin allergies</b>	<b>Bronchitis</b>	<b>Asthma</b>
<b>1980</b>	12	12	16
<b>1985</b>	19	19	22
<b>1990</b>	20	23	25
<b>1995</b>	28	25	29
<b>2000</b>	40	43	41
<b>2005</b>	43	42	45
<b>2010</b>	50	53	55
<b>2014</b>	52	55	59



**Graph 6. Increase in no. of people suffering with diseases in Ibrahimpatnam**

**Table 7. Report of effluent discharge of the outlet water from the industries into river**

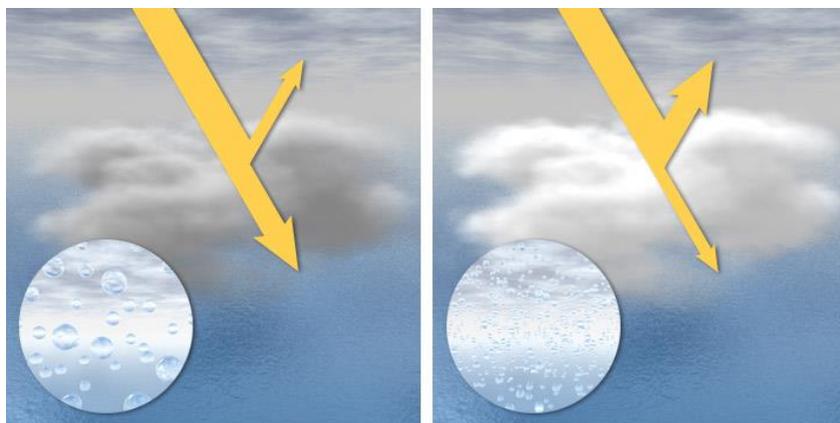
Sno.	Paramaters	ISO standards	APPCB report	collected data
1	pH value	7	6.92	8.1
2	Total suspended solids (mg/l)	100	50	86
3	Chemical oxygen demand (mg/l)	225	152	251
4	Bio chemical oxygen demand (mg/l)	30	22	46
5	chlorides	225	68	243
6	sulphates	150	62	190
7	Oil & grease	10	4	6



**Graph 7. Graph of effluent discharge**

### **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. Formation of dark and light clouds due to the affect of aerosols**

### **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.[12] The black clouds are formed due to aerosols which contain suspended particulate matter (SPM), dust particles etc., and this is leading to lack of sunlight and proper photosynthesis. The results also show that this would be one of the reasons for great weather changes between Vijayawada and Ibrahimpatnam. The temperature in Ibrahimpatnam is gradually increasing due to the large amount of effluents that are being emitted because of various industries in this area. 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  $\text{SO}_x$  and  $\text{NO}_x$  compounds.



The development of industrialization in Ibrahimpattam 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. Also, the burning of the dung cakes evolves these gases. The effect of other GHG's in Ibrahimpattam is making it as a heat island. The other human activities like transportation and urbanization are adding sensitivity to it and making it vulnerable. Since climate is long term change in weather [almost 3 decades], most part of the study was, based on the weather conditions in Ibrahimpattam as mentioned in the results and discussion, the climate in the following decades would turn adverse.

### **Conclusions:**

These are a virtual trading of GHG benefits where the problem may not actually be solved but it may just be circumventing the problem. Climate change policies cannot achieve their objectives by supporting and targeting only a few sectors while ignoring the domestic and small scale industries. The challenge is not just to avoid emissions but also to reduce emissions at source. The host priorities have to get reflected in the climate change projects, or at least there has to be greater transparency to ensure that the broader objectives and principles of the climate change policies are kept in mind. Convergence of interests among different stakeholders is also needed. A number of people point out that climate change policy instruments are not a 'solution for everything' and all kinds of projects and sectors cannot be included under these options.

The idea, however, is to use them for genuinely 'additional' projects in energy-relevant sectors for betterment of the environment and achieving national sustainable development benefits at the same time. 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 in 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, A forestation, 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 CO<sub>2</sub>, 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. While all possible mitigation and adaptation measures should be considered by us, there is also a need to see that the climate change issue is not overplayed as cautioned by UNDP. The HDR Report 2007/2008 of UNDP has also warned that “climate change will undermine international efforts to combat poverty, Climate change is hampering efforts to deliver the MDG promise. Looking to the future, the danger is that it may stall and then reverse progress built up over generations not just in cutting extreme poverty but also in health, nutrition, education and other areas”. This danger needs to be guarded against with full commitment and zeal.

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