Economic Impact of Thermal Pollution on Agriculture and Allied Activiteis - A Study on Ktps, Palvoncha,Telangana State

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Abstract

The present studyexamines the economic impact of thermal pollution on agriculture and allied activities. The study was conducted in the geographical area that comes under the polluted zone of Kothagudem Thermal Power Station at Palvoncha, Khammam District. The sample was drawn from the respondents of selected villages around the thermal power plant. The sample drawn for the study was 150. Descriptive research design was adopted for the present study and data was collected through scheduled method. Multi-stage sample technique was used in order to collect the sample. Statistical tools like Cross tabulation, Frequency counts, averages and ANOVA were applied to analyze the data. The results reveal that the thermal pollution had a significant and adverse impact on agricultural productivity and allied activities of the farming community in the study area.

Key Words:*Agriculture, Allied activities, Thermal Pollution, productivity.*

I. INTRODUCTION

The industrialization spews out large amount of wastes on planet .These wastes are the byproducts of industrial goods. In contrast to natural processes where everything Gets transformed into some form or other within a certain period , these Industrial leftovers have accumulated in the atmosphere, on earth and in water bodies. Broadly speaking, ultimately, they interfered with various food chains affecting all biological life-trees , birds, etc… and finally man himself. This has been the worldwide phenomenon wherever industrialization has taken place.

The problem of industrial waste management challengers us , as a society , to take as much care for present and succeeding generation as for those in the distant future .It is increasingly becoming clear that the sources and causes of population are far more defused, complex, and inter-related, and efforts of population are more wide spread, cumulative and chronic. The challengers are both inter-dependent and integrated , requiring comprehensive approaches and popular participation .These challengers derive as much from the extraordinary institutions (and perhaps technical), design problems of dealing with waste materials as from the socio-economic implications of such interventions .Yet most of the institutions facing these challengers tend to be independent, working to relatively narrow mandates with closed decision processes .While the real world of inter locked economic and ecological systems will not change, the policies and institutions must. The one great institutional flow is government's failure to cope with environment , development challengers and to make the bodies whose policies action degrade the environment responsible for ensuring that there policies prevent that degradation. Many government's have established environmental ministries and agencies to clean up the mess .But the narrow mandates of these agencies could not cope up with the challengers comprehensively. Thus the social properties of a pollution management continue to present unprecedented theoretical and methodological challengers for the social science community and especially for the economic analysts.

II. SIGNIFICANCE OF THE STUDY

The environmental consequences of rapid industrialization have resulted in countless incidents of land, air and water resources sites being contaminated with toxic materials and other pollutants, threatening humans and ecosystems with serious health risks. More extensive and intensive use of materials and energy has created cumulative pressures on the quality of local, regional and global ecosystems.

Among recognized scientists and scholars, there are generally two schools of thought when it comes to the effects of thermal pollution. Some lean on the side of the negatives of this pollution on marine

ecosystems and how it is detrimental to positive environmental practices. However, some lean towards the side that without these industries operating the way they do, then some of the most basic parts of human life would be completely obsolete. Waste water would not be able to be properly maintained, we would have no industries that could produce the goods we need, and so on. The effects of thermal pollution on ecosystems, however, greatly outweigh the benefits that industries have by participating in the act. Above all else, the most important thing to consider is that the effects of thermal pollution greatly outweighs the human need for it to be done.

III. NEED FOR THE STUDY

Many surveys show that thoughtless and haphazard industrialization causes environmental degradation that brings changes in material conditions and has very serious implications for physical , mental(health) , economic and social well being of the people which in turn leads to changes in their behavior pattern, social structure and culture.

There is a need to carry-out economic and environmental studies to understand the implications of industrialization in various domains- pollutions, productions, forest culture, agriculture and allied activity followed by social life in general.

For the purpose of present study the geographical areas (selected mandals) in the vicinity of KothagudemThermal Power Station (KTPS), Palvoncha, Khammam District of Telangana State.

IV. REVIEW OF LITERATURE

Klaus Michael Meyer – Abick's book (1993) was revolutionary, in which he states that there should be a radical change in the perception of nature. The environment is not a resource for humans, since it and we are equally parts of nature's whole. He held the opinion that we cannot harm the rest of this whole – the 'co-natural world', without harming ourselves. This book explains his holistic alternative to the 'incomplete enlightenment' of the dominant western world view. Michael Jochin (1981), examined the relationships between cultural behavior and it's environmental context.

There is another important book by Pancavati (1992) that highlights the Indian thinking regarding environment. The most notable features of Indian Civilisation are it's antiquity, continuity and vitality. Indian sages and seers from the beginning recognized the vital importance of maintaining the ecological balance for the general welfare of mankind as well as for all other beings in the universe. They advocated an integrated approach to progress aimed at harmonious development, so that there is no undue exploitation of natural resources. Apart from sociological effects due to environmental changes due to the production of energy from different sources, there are many economists who concentrate on not only energy, but also it's effects on environment. Nowadays, people are not in a position to keep quiet when environmental pollution is involved in the production of not only energy but also in any other economic activity. In the year 1976, Narinder Singh wrote a book 'Economics and the Crisis of Ecology', in which he expressed his ideas. He opined that development and environment have become increasingly intertwined. Mason Willrich (1978), in his book offered a comprehensive and yet incisive introduction to the political, economic and environmental aspects of global energy problems.

There is a growing realization among developing nations, of the ecological dimensions of development. Since ecological system is complex, it cannot be ignored in future strategies of development. In the book 'Energy and Security', the shortcomings of Non – proliferation Treaty of 1967 were shown clearly and the authors dealt with the after effects of oil crisis of 1973. The problems of resource depletion, pollution and environmental amenity had, perhaps, not been given previously as much attention as they warranted. Boulding has argued that recognition of the fact that the economic system is embedded within a larger eco-system, call for a fundamental re-appraisal of the basic concepts and analytical methods of economists. In his paper 'The Economics of the coming Spaceship earth' he said the spaceship economy thinking is appropriate than cowboy economy thinking. When the construction of nuclear plants escalated and oil production possibilities looked bleak in future, the demand and dependence on coal became too heavy. Energy analysis is not viewed as a substitute for economic analysis, but as a complement to it.

At present we have a society seemingly dependent on a staggering variety and quantity of chemicals and an environment suffused with harmful chemical agents. They are released in the manufacture and use of plastics, paints, cleaners, water disinfectants, construction materials, pesticides, fertilizers, dyes, preservatives, fire retardants, batteries, brake linings, fabrics, food additives, cigarettes, drugs and many other products. Other widespread technological activities also have serious implications for chemically induced Cancer, Heart and Respiratory diseases. They include lead and copper smelting, Coke Oven emissions, radiation and combustion of fossil fuels in automobiles, power plants and the like. As a result of these myriad exposures, the throat, the lungs,

the intestines, kidney, liver, heart, bold and genes are all subject to excessive stress, infection, poisoning, cancers, genetic mutations and birth defects. But the resistance of the body became far less to the present pollution in the environment.

V. OBJECTIVES

1. To analyze the effects of thermal pollution on agriculture in the select study area
2. To analyze the effects of thermal pollution on allied activities of agriculture in the select study area
3. To suggest certain policy measures on the basis of the findings of the study

VI. HYPOTHESIS: (ALTERNATE HYPOTHESIS)

H_{a1} : Thermal pollution has a significant impact on agricultural and allied activities in the select area for the study.

Test Applied: ANOVA

VII.RESEARCH METHODOLOGY

Research Design	Descriptive Research design
Data Type	Both primary and secondary
Data collection techniques	Schedule Method (Structured) (Questionnaire + Interview)
Sampling method	Probability Sampling- Multi-stage Random Sampling method
Sample size	150
Sampling area	Selected villages around KTPS, Palvoncha
Nature of sampling organization	Thermal Power Station (Power Generation Units)
No.of organizations selected for the study	1
Geographical location of the sampling units	Khammam District of Telangana State
Statistical tools applied for analytical study	Cross tabulation, Frequency counts, averages and ANOVA
Dimensions examined	Agricultural patterns and Allied activities.

VIII. DATA ANALYSIS AND INTERPRETITION

Table – 1: Age Composition Of Sample Respondents

Age	Frequency	Percent	Cumulative Percent
21-30 years	1	.7	.7
31-40 years	6	4.0	4.7
41-50 years	43	28.3	33.0
>50 years	100	67.0	100.
Total	150	100.0	

Table – 1 gives details about the age composition of sample respondents. One hundred (100) out of 150 respondents come under the age group of above 50 years constituting 67 percent of the total respondents. This shows that majority respondents are well aware of environmental status before industry and changes in the environment after industry and adverse impact of Thermal pollution.

Table – 2 : Caste Compostition Of Sample Respondents

Castes	Frequency	Percent	Cumulative Percent
BC	76	51.0	51.0
SC	15	9.7	60.7
ST	50	33.0	93.7
OC	9	6.3	100.0
Total	150	100.0	

Source : Field study.

Table 2 Explains the caste composition. Out of total (150) respondents, 76 respondents belong to B.C community, constituting 51 percent of the total respondents. S.T. community respondents forming 33 percent of the

total respondents standing next to B.C community (51 percent). This shows the magnitude of the damage caused to BC community due to pollution in this area.

Table – 3: Sex Composition Of Sample Respondents

Sex	Frequency	Percent	Cumulative Percent
Male	147	98.3	98.3
Female	3	1.7	100.0
Total	150	100.0	

Table-4 Marital Status Of Sample Respondents

Status	Frequency	Percent	Cumulative Percent
Married	150	100.0	100.0

Source : Field study.

Table -3 and 4 explain marital status and sex composition of respondents All the respondents are married and 98 percent are male.

Table -5 Educational Status Of Sample Respondents

Education	Frequency	Percent	Cumulative Percent
Illiterate	82	54.3	54.3
Primary	44	29.0	83.3
Secondary	21	14.0	97.3
Higher	3	2.7	100.0
Total	150	100.0	

Source : Field study.

Table -.5 presents the analysis of educational status of sample respondents. Eighty two (82) respondents out of 150 are illiterates. They constitute 54.3 percent of the total respondents . The percentage of respondents who have primary and secondary education are 29.0 percent and 14 percent respectively. The number of respondents who has higher education is only 3 and their percentage to total respondents is just 2.7. This shows that the majority of the respondents are illiterates.

Table-6.Years Of Stay Of Respondents

Years of Stay of Respondents	Frequency	Percent	Cumulative Percent
21-30Yrs	3	1.7	1.7
31-40Yrs	7	4.7	6.3
Above 41 Yrs	140	93.7	100.0
Total	150	100.0	

Source ; Field study.

Table – 6 describes how long the respondents have been living/ staying in this area. The percentage of respondents who have been living for more than 40 years is 93percent. The percentage of respondents who come under the age group of above 40 years constitutes 95 percent (table-1). This shows that all the respondents have been living in this area since their birth.

Table -7 Income Particulars Of Respondents Per Annum(In Rs)

Income	Frequency	Percent	Cumulative Percent

Below Rs 11000	40	27.0	27.0
Rs 12000-15000	58	38.7	65.7
Rs 16000-20000	39	26.0	91.7
Above Rs 20000	13	8.3	100.0
Total	150	100.0	

Table 7 gives income particulars of respondents. Out of 150 respondents 40 respondents have only below Rs.11000/- income for annum and only 13 respondents belong to the income group of above Rs.20,000/- per annum. The cumulative percent of the respondents who belong to below 11,000 and 12000 – 15000 income groups is 65.7. This reveals that majority of respondents are poor and have low living standards

Table- 8 Crop Wise Yield Per Acre Before And After Benchmarked Period(In Quintals)

Sl. No	Crop	Number Acres Grown	Total yield in quintals		Average yield per acre in quintals		Total crop lost/decrease in quintals	Average Decrease per in quintals	Percentage decrease
			Before	After	Before	After			
1.	2	3	4	5	6	7	8	9	10
1	Rice	722 (90.93)	13,349 (95.56)	10,604 (95.97	18.48	14.68	2745 (94.0)	3.8	20.56
2	Cotton	38 (4.78)	374 (2.67)	275 (2.48)	9.84	7.23	99 (3.39)	2.6	26.42
3	Ground Nut	15 (1.88)	159 (1.13)	108 (0.97)	10.6	7.2	51 (1.74)	3.4	32.07
4	Pulses	19 (2.39)	87 (0.62)	62 (0.56)	4.5	3.2	25 (0.85)	1.3	28.88
	Total	794	13,969 (100.0)	11,049 (100.0)			2920 (100.0)		

Source : Field study
Note : Figures in the brackets indicate percentage to total.
Before : 2004. After : 2014.

Table -8, explains acreage of crops grown yield per acre (before and after bench marked years for a period of 10 years i.e. 2004-2014 to study the pattern of the effect of pollution) and decrease in productivity of different crops. The total yield is obtained by summing up yielding of all holdings cultivated under the crop. The average yield per acre is calculated by dividing total yield of all holdings by number of acres of all holdings of the crop. According to table 8 , rice is grown in 722 acres, which constitutes 90 percent of the total sample land. The acreage crops of cotton, groundnut and pulses is 38 acres, 15 acres and 19 acres respectively. The average decrease per acre in the yield is 3.8 quintals and the percentage decrease is 20.56 percent. Similarly the percentage decrease in the yield per acre in case of cotton crop is 26.42 percent and 32.07 percent and 28.88 percent in case of crops Groundnut and Pulses respectively. But the rice is grown both in khariff and Rabi seasons and the other crops are grown only once in a year. More over the acreage of rice crop is also higher than that of all other crops separately and collectively. Hence it can be perceived that damage caused due to pollution is heavy on the rice crop than on all other crops.

Table -9 Cropping Pattern In The Study Area

Crop	Frequency	Percent	Cumulative percent
Food crops	109	72.3	72.3
Commercial crops	15	9.6	81.9
Both	26	18.1	100.0

Total	150	100.0	

Source : Field study

According to table 9, the number of farmers who are growing food crops is 109 comprising 72.3%. 15 farmers are growing commercial crops comprising 9.6%. 26 respondents are growing both the crops comprising 18.1%. The commercial crops comprise only cotton and groundnut. It follows from the above details that, only the rice is dominating the cropping pattern in this area.

Table 10 : Impact Of Pollution On Allied Activities Of Agriculture

Impact	Frequency	Percent	Cumulative percent
Dairy	32	21.3	21.3
Poultry	2	1.3	22.7
Live stock	2	1.3	24.0
Dairy and cattle	100	67.0	91.0
No activity	14	9.0	100.0
Total	150	100.0	

Source : Field study

Table 10 describes the impact of pollution on the allied activities. It shows that about 21.3 percent respondents were affected by the adverse pact of pollution on the dairy. About 67 percent of respondents were affected due to the adverse impact of pollution on dairy and cattle rearing activities. It can be inferred that 91 percent of respondents are affected by the adverse impact of thermal pollution on allied activities.

Table-11 Verification Of Hypothesis Anova Results

Dimensions	SS	MS	F-cal	P-Value	Sig.	Result
Agriculture	0.08	0.04	0.06	0.74	0.004	Sig.
Allied activities of Agriculture	2.34	0.80	1.12	0.36	0.000	Sig.
Error	52.32	0.74				
Total	**54.74**					

Result: The test result shows the positive statistical significance of the above alternate hypothesis (H_{a1}) and hence the above hypothesis is accepted.

IX. CONCLUSION

The thermal power plants pollution in the study areas is very severe and affected the people badly in all spheres of life. The pollution affected adversely the agriculture and allied activities. It rendered some people landless, made some people to give up cattle rearing and other allied activities, reduced the size of operational holdings made cultivable lands unfit for cultivation. Due to thermal power plants pollution some people lost their livelihood. The pollution altered the pattern of land possession, changed the occupational structure reducing some farmers from farmers to coolies. Ash pond polluted ground water making it unfit for agriculture and domestic uses. Continuous use of polluted water to irrigate fields resulted in some lands become barren, decrease in the productivity of crops.

Hence the remedial measures should focus on compensating the victimized people, rationalizing the electricity consumption, prevention of pollution or arresting/ reducing pollutants and conservation of wastes into useful materials.

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