

Impact Of National Thermal Power Coal Ash Towards Agriculture And Environment In Dadri Block GB Nagar, UP

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Abstract

In India, the abundantly available natural resource is found to be coal. Subsequently, coal is employed widely as a fuel or thermal energy source for thermal power plants in the generation of the electricity. TPC Dadri power plant, also known as National Capital Power Station (NCPS), is a coal and gas-fired thermal power plant located near the town of Dadri in the district of Gautam Budh Nagar, Uttar Pradesh, India. It is located 9km from Dadri town and 48km from Delhi, the capital city of India. National Thermal Power Corporation (NTPC) is the project owner. Considering some of the social and environmental issues, this study reveals the social impact of thermal power plants, particularly its fly-ash, in the project surrounding region based on the opinion of PAFs and SRs. It discloses that the cultivated land of major PAFs has been acquired by the plant authority. Again most of them have not yet been rehabilitated, compensated or employed in the project. It is also advocated for the proper arrangement of rehabilitation for the dispossessed people on a priority basis and it should be executed eventually by consulting with the government. It should be obligatory for the project authority to implement the forestation program within the plant areas along with its adjoining areas. The plant authority should instigate various activities to improve the economic condition in the nearby part of TPS. The plant authority should strictly put into practice various legal provisions like a compulsion for the allocation of funds (2 percent of profit) as per CSR Rules uD. der Companies Act, 2013, etc. to maintain a social and environmental balance in the locality.

Keywords

NTPC Ash, Natural resources, Water Quality, Environmental degradation, Industrial waste, Air pollution, Agricultural land, Thermal power plant.

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Introduction

In India, the abundantly available natural resource is found to be coal. Subsequently, coal is employed widely as a fuel or thermal energy source for thermal power plants in the generation of the electricity. India comprises of an approximately of 90,000 MW installed capacity for the generation of the electricity among which more than 70 percent is found to be generated by coal-based thermal power plants. In comparison to the other power-generating sources, it is noticed that hydroelectricity contributes around 25 percent, and the remaining power is generated by utilizing nuclear power plants (NPPs). However, several issues are found based on the usage of coal as a source of thermal power plants were given as low calorific value and the high ash content. The other factor that was observed to be in correlation with the thermal power plants was found to be the location of the coal being situated in the eastern parts of the country. This was observed to increase the cost of transportation as it requires conveyance over long distances generally by using trains that utilize diesel for the movement. In the foreseeable future, there are no significant options for generating electricity as the most likely option is found to be the nuclear power program envisages installing 22.5 GW by the year 2031. However, the installation of the nuclear power plant is found to contribute only 5 percent of the installed capacity. Recently, a study on a thermal power plant located at Kolaghat revealed the impact on the vegetation and soil in surrounding areas of the power plant. It was also observed that the concentration of the pollutants varies based on the direction of the wind leading to alteration in the gradient of structure and operative change in plant and soil. Therefore, it is necessary to consider and investigate approaches in reducing the adverse effect of coal-fired power plants on the environment.

About National Capital Power Station (NCPS)

A coal and gas-fired thermal power station called TPC Dadri, sometimes referred to as National Capital Power Station (NCPS), is situated close to the town of Dadri in the GautamBuddh Nagar district of Uttar Pradesh, India. It is 48 kilometers from Delhi, the Indian capital city, and 9 kilometers from Dadri town. The project's owner is National Thermal Power Corporation (NTPC). The Dadri power station is one of India's largest thermal power plants, with a total installed capacity of 2.63 GW. The coal-fired plant's four units were turned on in that order in October 1991, December 1992, March 1993, and March 1994.

The second stage consists of two units of 490MW each, which started operations in January and July 2010, respectively. Of the total power generated, 1,820MW comes from the coal-fired plant. The coal-fired plant was built in two parts, the first stage included four 210MW units and the second stage included two

additional units. The gas-fired power plant generates the remaining 817MW using two 154.51MW steam turbines and four 130.19MW gas turbines. May, June, August, and December of 1992 saw the commissioning of the gas turbines at the gas-fired facility. The two steam turbines were put into service in April 1997 and August 1996, respectively. NTPC Dadri includes a 5MW solar plant in addition to the coal and gas-fired power stations.

National Thermal Power Coal (NTPC) supplies the power generated by the gas-fired power plant to the Indian Railways as well as to the states of Uttar Pradesh, Utrkhand, Rajasthan, Delhi, Punjab, Haryana, Himachal Pradesh, Chandigarh, and Jammu & Kashmir whereas the power produce by coal is supplied to the railway, U.P.and Delhi.

Literature Review

Study on this particular topic of thermal power plants is very scanty. However, some related references have been briefed here. Kumari (2009) examined that fly-ash affected the normal respiration and photosynthetic rate including the yield of crops, it has only enlightened on the implication of fly-ash on vegetation. Jadav et al. (2010) analyzed the impacts of the wastewater stored in the underground water quality. Wastewater with hazardous substances in ash ponds has leached and percolated through the soil layers and reached into the groundwater which becomes vulnerable and interferes with natural conditions of water as well as affects the aquatic life. The underground water quality near the thermal power plant has only been assessed here. Like this Lokeshappa and Dikshit (2011) Studied the negative impact of industrial wastes including fly-ash in plant surrounding environs. Besides, this disposal of fly-ash and its extensive use in various construction materials have created other problems. A. nsari et al. (2011) advocated that the solid waste which is produced by the coal fed thermal powerplants and causes threats not only to human beings but also to the environment may be applied for the purpose of garden soil and may be utilized in horticultural cropping. So a bulk quantity of solid waste may productively be used. Dasgupta and Paul (2011) investigated the impact of coal ash on the surrounding land of the TPPs in respect of its change in use and its degradation. And implementation of better technology and afforestation program in the surrounding area has been recommended. Even an empirical study on this issue is too much essential in this present scenario. An attempt has been made to bridge the gap.

Objectives of The Research

Through this effort, an attempt has been made to calculate the social and environmental cost imposed by National Thermal Power Coal Ash. Here, it is also

clarified the corrective actions performed by the project authorities for the development of research-affected areas (PAAs).

- To find out the agricultural and environmental factors affected by national Thermal Power Coal ash.
- To find out the agricultural and environmental situation of Dadri Block of UP.
- To Implication of different remedial measures carried out by plant authorities.

Research Methodology

This present paper is completely based on primary as well as secondary data in nature. To study the above, one of the foremost National Thermal Power Coal ash (NTPC) under the Delhi Power Sector has been selected. The study is empirical and exploratory in nature. It is based upon the primary data which are collected out of the personal interview with different respondents of three levels by using a stratified random sampling technique surrounding the plant area of NTPC. The power plant is treated as the center of the study circle and some concentric circles are taken as strata depending on the pollution intensity of the area surrounding the plant. First, number of Project Affected Families are selected randomly in the GB Nagar area of the plant and interviewed with a structured questionnaire to collect primary data. Next, 137 families in the Dadri block of the plant have been taken into account with similar questionnaire. Finally, the opinion of 56 selected social representatives has been taken into consideration using a special type of structured questionnaire. For secondary data, different websites, books, journals and dailies are consulted. The SPSS package is used for the statistical analysis of data. Descriptive statistical methods have been taken into consideration for data analysis. For qualitative data analysis, 5 points Likert's Summated Scale has been applied.

Data Analysis and Findings

The present study entitled "Impact of National Thermal Power Coal Ash Towards Agricultural And Environment in Dadri Block GB Nagar, UP" explained the detailed analysis of the primary data has been outlined here from different perspectives viz. general profile of the respondents, Agricultural status, environmental condition including effect of fly-ash, remedial measures and association of different variables with distance from National Thermal Power Coal. All these are presented below under several subsections. Study Area of the survey has been conducted selected villages of Dadri Block GB Nagar of Uttar Pradesh.

Socio- agricultural Status of Respondents

Most of the surveyed families live in their own houses (97 percent) of which 70.3 percent are paccahouses. With regard to the holding of agricultural land by the sample PAFs, the study exposes that though it is an agricultural-based rural area still, they argued that due to the acquisition of their cultivable land by the project authority, only 39.4 percent have the agricultural land. A very few PAFs have used the modern sophisticated amenities like refrigerators (3.6 percent), connection of gas (32.0 percent), computers with internet facilities (1.9 percent), etc. On the contrary, most of them (90 percent) have common utilities like bicycles, television, etc. Hence majority of them are in the meager financial stipulation. In respect of transport and communication facilities, the survey reveals that 33.5 percent PAFs and 30.4 percent SRs have expressed that average facilities are available in their locality, whereas about 28.9 percent and 48.2 percent respectively are fully dissatisfied with it. Again about 26.1 percent and 48.2 percent respectively have expressed their opinion ‘dissatisfaction’ about the available educational facilities in their area. A significant point is that most of them have expressed their dissatisfaction as there is no college in their zone. The unavailability of library facilities in the areas is also an important point. The majority of the PAFs (68.3 percent) along with SRs (8.2 percent) have expressed their reasonable contentment with existing medical facilities. However, it shows that about 11 o/o PAFs have no medical facility. However, a very few selected NTPCs (5.1 percent) are dissatisfied with the issue.

Environmental Impact

Thermal power facilities quietly contaminate the atmosphere nearby with a variety of contaminants. Even yet, residents in the area surrounding the project experience rapid changes in their way of life. Therefore, the impact of TPP, notably coal-ash, on several environmental issues has been illustrated here based on the responses of surrounding PAFs.

Table-1: Coal Ash Dumped in The Locality

Coal Ash Dumped	Yes	NO	Total
PAFs (percent)	64.0	36.0	100.00
SRs (percent)	58.9	41.1	100.00
BFFs (percent)	21.9	78.1	100.00

Not less than 64.0 percent of PAFs and 58.9 percent SRs have burst out their displeasure as coal ash has been dumped all over the place in their locality. In comparison with distant places, it is only 21.9 percent.

Table-2: Geological Change Due to Dumping Coal Ash in The Locality

Geological Change	PAFs (percent)	SRs (percent)	BFFs (percent)
Very little	11.50	23.20	8.00
Partially	10.90	19.60	0
Completely	15.80	17.90	18.20
Uniquely	2.9	39.30	21.20
Not at all	8.90	0	52.60
Total	100.00	100.00	100.00
Mean	3.92	3.37	2.47
S.D	1.38	1.21	1.72
Skewness	-0.95	-0.28	0.48
Kurtosis	-0.52	-1.51	-1.61

With respect to major geological alteration (Table-2) caused by coal ash dumped in their locality, there is too much similarity between the opinions of PAFs and SRs. The table displays that 68.7 percent of selected PAFs and also 57.2 percent of selected SRs in KTPS surrounding areas are awfully worried about on this aspect. In contrast, most of the BZFs (60.6 percent) have conversely replied on this issue.

Table-3: Presence of Dust in House

Presence of Dust	PAFs (percent)	SRs (percent)	BZFs (percent)
Very high	55.40	60.70	1.50
High	38.90	25.00	10.20
Average	3.70	12.50	26.30
Low	1.60	1.80	12.40
Very low	0.40	0	49.60
Total	100.00	100.00	100.00
Mean	4.47	4.45	2.01
S.D	0.68	0.78	1.14
Skewness	-1.50	-1.22	0.63
Kurtosis	3.38	0.59	-0.90

At least 94.3 percent have expressed horribly about not only high but also the very high-level presence of fly ash in air as well as on houses. The descriptive statistics for PAFs furnishes the mean value 4.47 on 5 point scale.

Table -4: Impact of Air Pollution on Trees and Agricultural Land

Presence of Dust	PAFs (percent)	SRs (percent)	BZFs (percent)
Very high	28.90	53.60	9.50
High	17.80	28.60	10.90
Average	46.4	14.30	21.20

Low	6.20	3.6	21.90
Very low	0.80	0	36.50
Total	100.00	100.00	100.00
Mean	3.68	4.32	2.35
S.D	0.99	0.86	1.33
Skewness	0.08	-1.04	0.62
Kurtosis	-0.97	0.21	-0.77

As per the perception of respondents on impact of air pollution on agricultural land and trees in PAAs, it is observed from the Table-4 that the majority of PAFs (46.7 percent) and SRs (82.2 percent) have well-expressed the high or very high terrifying impact. Views differing from this have been uttered by BFFs. The descriptive statistics have also a similar indication.

Table-5: Discolouring Effect on Trees and Plants

Presence of Dust	PAFs (percent)	SRs (percent)	BZFs (percent)
Highly decreasing	0	0	3.6
Decreasing	0.20	1.80	65.7
Static day by day	2.3	1.80	19.7
Increasing:	3.4	5.40	10.90
Highly increasing	94.1	91.1	0
Total	100.00	100.00	100.00
Mean	1.09	1.14	3.62
S.D	0.37	0.52	0.73
Skewness	4.71	4.23	-1.01
Kurtosis	23.00	19.1	0.40

Nearly each one of the PAFs has been living in the particular PAAs for a long period of time; most of them are the resident before the incorporation of the project. They have observed that the intensity of the green color of trees and plants closest to the project has been disappearing very fast. At least 97.5 percent PAFs and 96.5 percent of SRs have observed such a phenomenon. On the contrary, the largest parts of BZFs have not agreed with the same.

Table-6: Yield of Different Crops

Presence of Dust	PAFs (percent)	SRs (percent)	BFFs (percent)
Not Applicable	60.60	21.40	43.10
Applicable	39.4	78.60	56.9
Total	100.00	100.00	100.0
Highly increasing	0	0	12.8
increasing	0	0	67.9

Static day by day	6.10	6.80	15.4
decreasing:	21.20	72.70	3.8
Highly decreasing	72.7	20.50	0
Total	100.00	100.00	100.00
Mean	1.33	1.89	3.90
S.D	0.59	0.51	0.66
Skewness	1.58	-0.24	-0.74
Kurtosis	1.43	0.74	1.53

The applicable section of the Table 6 includes the percentage of respondents of each class who have the cultivated land at present in the TPS surrounding areas. It reveals that almost 93.9 percent pass of applicable section and 93.2 percent SRs of the same have expressed their frustration that yield of crops has been considerably diminishing. In each case, the mean score remains below point 3 which also signifies the same. But reverse views have been observed for BZFs.

Environmental Awareness

Environmental Awareness of projects surrounding people regarding the intensity of pollution caused by TPS particularly emission of solid waste in the air has been studied at this stage.

Table-7: Idea About Coal Ash Removed From TPP

Presence of Dust	PAFs (percent)	SRs (percent)	BZFs (percent)
Uniquely	1.20	73.20	100
Completely	1.30	23.20	0.00
Partially	4.20	3.60	0.00
Very little	7.20	0.00	0.00
Not at all	86.0	0.00	0.00
Total	100.00	100.00	100.00
Mean	1.25	4.70	5.00
S.D	0.70	0.54	0.00
Skewness	3.36	-1.59	0.00
Kurtosis	11.80	1.17	0.00

The above Table-7 presents that the most of the PAFs (86.0 percent) have confessed their lack

of awareness on this aspect. The descriptive statistics indicate the same. A negligible percentage (2.50 percent) is conscious of this issue. But most of the SRs (96.40 percent) are very much concerned on this issue.

Table 8: Awareness of Recycling of Coal Ash

Presence of Dust	PAFs (percent)	SRs (percent)	BZFs (percent)
Uniquely	0.00	0.00	0.00
Completely	3.50	0.00	0.00
Partially	3.10	7.10	0.00
Very little	2.20	8.90	3.60
Not at all	91.20	83.90	96.40
Total	100.00	100.00	100.00
Mean	1.19	1.23	1.04
S.D	0.65	0.57	0.19
Skewness	3.48	2.40	5.00
Kurtosis	11.00	4.60	23.30

The above Table no 8 explains that a negligible proportion of studied families are conscious about recycling of the coal-ash.

Conclusion

Considering some of the social and environmental issues, this study reveals the social impact of thermal power plants, particularly its fly-ash, in project surrounding region based on the opinion of PAFs and SRs. It discloses that the cultivated land of major PAFs has been acquired by the plant authority. Again most of them have not yet been rehabilitated, compensated or employed in the project. Inadequate living condition and food availability imply their socioeconomic backwardness. Most of them belong to low-income group (below Rs. 10000 per month). The majority of them have an education only up to a higher secondary level (around 75 percent of PAFs). It presents that the general education facilities are moderate, and higher education facilities are exceptionally poor as there is no college in this region. Overall, infrastructural facilities including transport and communication in PAFs are up to their satisfaction level. Most of the families are aware of coal ash which pollutes the environment dangerously and are well concerned about its removal from the KTPS. A large number have boldly expressed their displeasure about coal ash which being discarded in their surrounding area. They are also much aware of its adverse environmental effects on the geological change in their areas. The presence of fly ash from power plants in the atmosphere at its extreme level also makes the surrounding residents much concerned as well as highly dissatisfied with it. The surrounding inhabitants have strongly asserted that houses, crops and other plants in areas are fully wrapped with emitted fly-ash. Again the expression on IW)id declination of greeneries and the negative impact of air pollution on agricultural land and trees in PAFs

have also been observed from the study. A significant decline in the yield of crops and regeneration of fish has been opined by all respondents. Most of the PAFs believe that pollution caused by TPS is the prime reason for much decline. It is observed that rate of suffering from various forms of chronic diseases by PAPs is relatively higher than that of BZPs. Most of them have a vigorous credence that pollution caused by TPS is a critical source of it. Again most of the PAFs as well as SRs are highly frustrated with the increasing intensity of pollution during the last five years. They have also viewed that different social disturbances including immoral activities have been sourced by the TPS particularly its coal-ash counterpart. However, most of the PAFs and SRs have expressed their satisfaction with respect to some infrastructural improvement but only a certain percentage of them have expressed their pleasure with different welfare activities undertaken by the project authority. It is recommended that the initiation should be taken by TPS for coal ash to implement different measures to mitigate social and environmental degradation caused by it. Again, coming forward with different CSR activities, the TPS authority may reprimand the different annihilation caused by it. It is also advocated for the proper arrangement of rehabilitation for the dispossessed people on a priority basis and it should be executed eventually by consulting with the government. It should be obligatory for the project authority to implement the forestation program within the plant areas along with its adjoining areas. The plant authority should instigate various activities to improve the economic condition in the nearby part of TPS. The plant authority should strictly put into practice various legal provisions like a compulsion for the allocation of funds (2 percent of profit) as per CSR Rules under Companies Act, 2013, etc. to maintain a social and environmental balance in the locality.

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