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# ASSESSMENT OF ENVIRONMENTAL QUALITY BY WOMEN, THE RANIGANJ COALBELT OF BURDWAN DISTRIT, WEST BENGAL

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**ABSTRACT :** Most of the environmental research done so far in India emphasizes its physical aspects and changes over time and space. However, geographers of late have studied environmental perception and have stressed that the personal, mental image of the environment is as important as the objective environment of the outside world. This mental image is the subjective environment, that is, the environment as perceived by human beings.

Women relate to the environment more closely than men, women see, understand, utilize and interact whit their environment in different ways too. In the Raniganj coalbelt, the women belong to different ethnic/caste groups and various economic classes. We made a sample survey among 189 respondents in 10 selected settlements of the Raniganj region. Women were asked to assess their environmental quality that is being affected by the recently expanding mining activities.

This paper relates women's assessment of the environmental quality through some appropriate attributes/adjectives of the environment. We have measured environmental quality using semantic differential scale method. The results show some variations in environmental quality assessments among women of different castes and economic groups.

## INTRODUCTION

There was a symbiotic relationship between humankind and nature for centuries. The scientific and technological revolution created the imbalance among them since the industrial revolution, but over the last few decades this imbalance has reached a crisis level. After the UN (United Nations) conference on environment in Stockholm in 1972, much attention was focussed on the problems of environment created by human activities.

The environment is defined as a complex system, which encompasses all aspects of bio-physical and socio-cultural factors. The first one includes the basic physical needs such as food, fresh air, fresh water, housing, clothing, etc. necessary for the very survival of life. The second one includes economic, political and intellectual needs such as education and employment opportunities, medical and health facilities, security, communications, freedom, recreation, entertainment and other services.

Environmental quality is a very complex concept because different people with different socio-cultural and religious backgrounds and philosophies of life perceive and interpret the quality in various ways. However, the environmental quality when perceived by human beings is refracted by the filters of culture and the lens of personal experience and imagination' to provide the behavioral environment (Lowenthal, 1961). Therefore,

the bio-physical factor interacts within its own components and generates the medium for the socio-cultural which is framed by people's unique experiences, imaginations and memory (Premi] Nuna & Menon, 1994; Gilpin, 1995). This imagination or mental image is the subjective environment, that is, the enviornment as perceived by the human beings.

During the twentieth century, especially after the Second World War, many developmental projects have been undertaken /completed by nations to improve the quality of life of human beings. At the same time, it has been recognized that no developmental project can leave the environment in its previous state and must have various impacts over it. Thus, development and environmental degradation came to be proportionately related. If we would like to raise the human development index (HDI), a measurement of development, we are likely to create more and more problems in environmental quality. Basically, rapid development of technology and socio-economic changes cause adverse side-effects on environmental quality such as soil erosion, fresh water availability, food production, energy utilization, pollution loading, higher rates of deforestation and desertification, and greater levels of soil salinization. In this regard, the UNESCO conducted the First Meeting of Experts on Indicators of Environmental quality in December 1976 (Premi, Nuna & Menon, 1994; Singh & Tiwari, 1980)

'Impact assessment' has become a common term nowadays. it means a group of techniques to improve the data base for decision making through a process of information generation related to the identification, prediction and assessment of the effects of project implementation (Smith, 1992). However, by the term we mean the evaluation of results with some degree of subjectivity (Barrow, 1997) – a fact that is often ignored in such analyses. This subjectivity can be of the researcher, or that of the subject of study. We intend to incorporate this subjective angle in our assessment study of enviornmental quality by using women residents' views of their environment. Here, by the terms 'assessment of environmental quality by women's we mean women's attitudes and evaluations of environmental parameters.

a) Natural resources-air, water, land, and forests, and

b) Social paramenters-population, health, job, opportunity, sanitation, entertainment, and food production etc. with some drgree of subjetivity.

We have tried to measure women's attitudes toward the environment because they occupy an important place in shaping social traits, making social relations, and conservation of environment. In addition, women are the largest huamn group to face the environmental hazards and risks, which are by products/side-effects of development.

The semantic differential method is one of the more effective and popular attitude measurement methods. It was designed and developed by Osgood, Suci and Tannenbaun (1957). It was further developed to expose connotative aspects of meaning by Warr & Knapper (1968), Heisse(1970), Burgess (1978), Heneson et al (1987). Many geographers like Golant and Buton(1969), Kasman (1970), Downs (1970), Mehrabjan & Russell (1975) have used this method to measure the women's attitude towards the environmental quality.

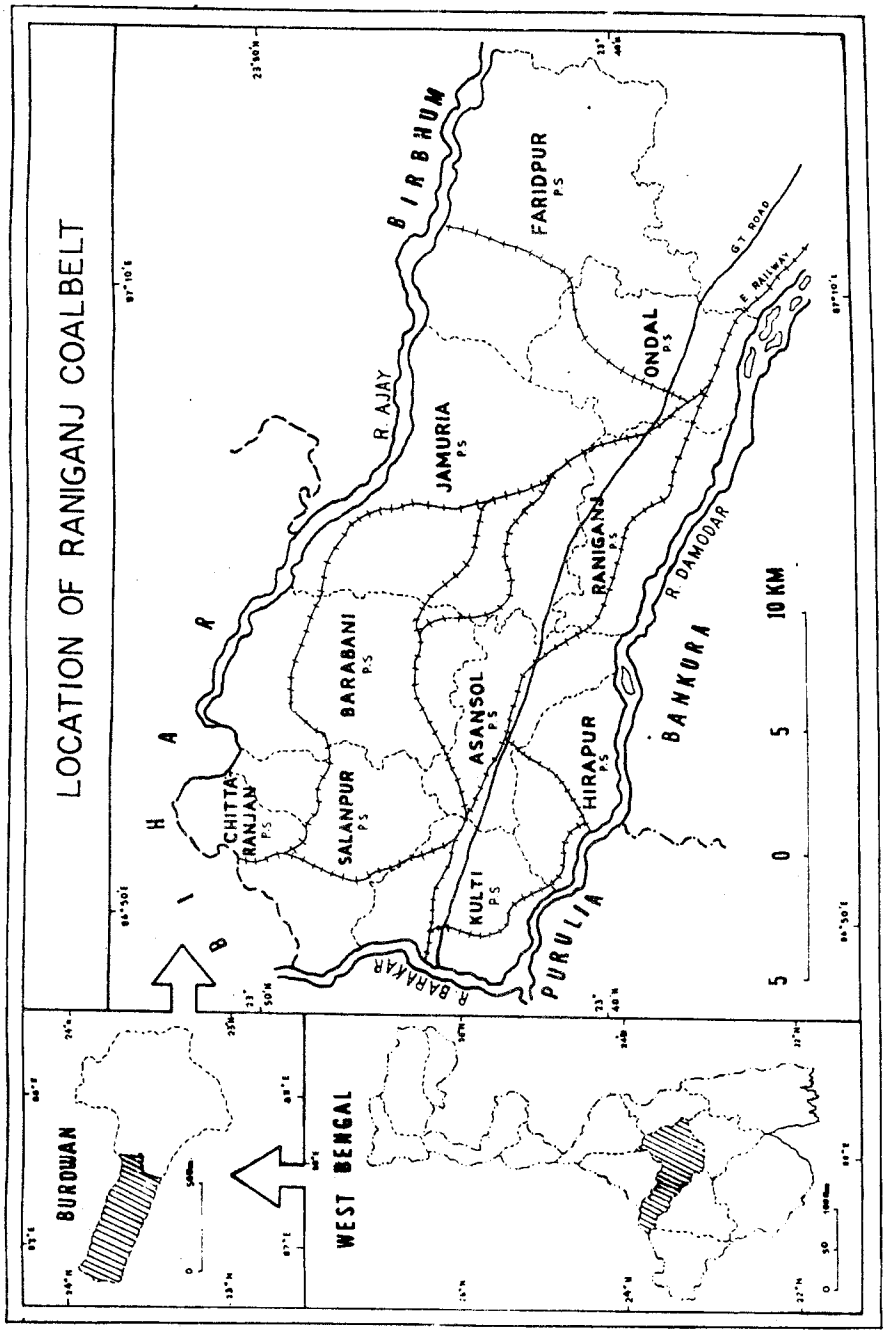


**Fig. 1 :** Location of Raniganj Coal Belt

In this article, we have searched the answers of two questions, namely,

i) What is the level of women's awareness of the environmental quality in the Raniganj coalbelt?

ii) Is there any attitudinal / perceptual difference betweeen the different income groups and between the ethnic caste groups of women?

## STUDY AREA & ITS FEATURES

The Raniganj coalbelt comprises a total area of nearly 1,260 square kilometres. The 23°33 to 23°53 north latitudes and 86°37 to 87°23 east longitudes bound the area. A major part of the Raniganj coallbelt defined as per the Coal India definition falls within Burdwan district, which we have identified as our study area. The coal seams extend under ground into Bihar where they have given rise to the Jharia coalfields. The Raniganj coalbelt is in true sense a naturally defined region; the river Damodar marks its southern whereas the river Ajoy and the river Barakar draw the northern and western boundaries respectively.

***Some relevant features of the study region :***

The region is highly populated. The density of population of the region is 1,739 persons per square kilometre whereas the district and state averages are 861 and 766 respectively. The total population, the scheduled castes population and the scheduled tribes population are 21,19,007, 486,3798 (22.19%) and 1,16,235 (5.3%) respectively (according to 1991 census).

The female male ratio is low with respect to district and state levels. The FMR (female per thousand males) value of this region is 830. But the FMR values of district and state level are 899 and 917 respectively.

The literacy level of this industrial region is poor. The total literacy rate is 52.56%, in comparison, female literacy is 41.8% whereas the district and state levels are 61.88% and 57.22% respectively.

There are 125 registered and 2,500 unregistered rural industries, collieries, four very important steel works at Kulti, Burnpur, Hirapur and Durgapur, thermal power projects of Damodar Valley Corporation (DVC) and Dishergarh, and a locomotive industry at Chittaranjan.

It has a higher level of urbanization as compared to national, state and district level averages, which are given below :

**Levels of Urbanization(1991)**
**Percent Urban to Total Population**

| | |
|---|---|
| India | 25.71 |
| West Bengal | 27.48 |
| Burdwan District | 35.09 |
| The Raniganj Coalbelt | 68.26 |

## METHODOLOGY

The semantic scale method measures the people's positive and negative feelings toward a perception object. Its score represents the respondent's general impression about an environmental stimulant. The scale consists of a series of adjectives and their antonyms listed on opposite sides with suitable attitude positions in between. We have taken 13 adjectives of environmental quality with five attitudinal positions in the following manner:

**Semantic Differential Scale**

| Adjectives and | Five attitude position/rating | | | | | Antonyms |
|---|---|---|---|---|---|---|
| 1. Congested | 1 | 2 | 3 | 4 | 5 | No crowding |
| 2. Dust from coal | 1 | 2 | 3 | 4 | 5 | Clean from coal |
| 3. Barren | 1 | 2 | 3 | 4 | 5 | Green |
| 4. Subsidence pronc | 1 | 2 | 3 | 4 | 5 | Stable |
| 5. Violent | 1 | 2 | 3 | 4 | 5 | Gentle |
| 6. Unhealthy | 1 | 2 | 3 | 4 | 5 | Healthy |
| 7. Untreated chemical | 1 | 2 | 3 | 4 | 5 | Clean water |
| 8. Smog from chimney | 1 | 2 | 3 | 4 | 5 | Clean air |
| 9. Lowering in ground water level | 1 | 2 | 3 | 4 | 5 | Unchanged groundwater |
| 10. Changes in river course | 1 | 2 | 3 | 4 | 5 | Unchanged river course |
| 11. Encroachment on agricultural land | 1 | 2 | 3 | 4 | 5 | No encroachment on agricultural land |
| 12. Full of wastes and garbage | 1 | 2 | 3 | 4 | 5 | Good waste disposal |
| 13. Unemployment | 1 | 2 | 3 | 4 | 5 | Job opportunities |

On this scale, the maximum and minimum values are 5 and 1. After interviewing each of 189 women, we allotted different scores from 1 to 5 for each adjective pair. To allot the scores we allowed some degree of subjectivity.

To select 189 respondents we followed a two-stage sampling procedure. In First-stage, we selected ten (10) villages from the entire region by systematic method. In second-stage, we followed the simple random sampling without replacement procedure. Then, we applied standard statistical hypothesis testing procedure. To search the answer of the first question (mentioned in subsection 1.6) we chose the null hypothesis ($H_0$): the mean semantic difference score ($\mu$) is equal to 3.0 and the alternative hypothesis ($H_1$): the mean semantic difference score ($\mu$) is greater than 3.0 i.e. $H_0$:$\mu$=3.0 against $H_1$: >3.0. We test this hypothesis for 13 adjectives of environmental quality.

To get the answer of the second question (metioned in subsection 1.6) we categorized the 189 women respondents into 11 income group and 5 caste groups, which are given below :

**Table 3.1**

**Income Category of Women Respondents**

| Income Categories | No. of Respondents | Income Categories | No. of Respondents |
|---|---|---|---|
| <500 | 43 | 2,501 - 3,000 | 19 |
| 501 - 1,000 | 53 | 3,001 - 3,501 | 07 |
| 1,001 - 1,500 | 23 | 3,501 - 4,000 | 12 |
| 1,501 - 2,000 | 18 | 4,001 - 4,500 | 02 |
| 2,001 - 2,500 | 05 | 5,001 + | 04 |

**Table 3.2**

**Caste Category of Women Respondents**

| Name of Ethnic Group | No.of Respondents | Name of Ethnic Group | No. of Respondents |
|---|---|---|---|
| Scheduled caste (SC) | 77 | Other backward class (OBC) | 40 |
| Scheduled tribe (ST) | 24 | General | 46 |
| Others | 02 | Total | 189 |

Then, we take the null hypothesis ($H_0$): all group means are equal, that is, every group has same attitude about the environmental quality. We test this hypothesis applying analysis of variance techniques for each pair of adjectives, which is stated above.

## ANALYSIS AND DISCUSSION

We found that women's awareness level towards environmental quality is good since the mean ( $\mu$ is greater than and equal to 3.0 ( $\mu > 3.0$). For this purpose we computed the table 4.1 which shows that women's high awareness, at levels of significance 5% and 1% in the Raniganj coalbelt. Though the status of women in this region is very low (Lahiri-Dutt, 1999), women are more concerned about the environmental quality. In particuler their attitude level is very high about four pairs of attributes, viz, the lowering in ground water level/unchanged ground water, encroachment on agricultural land/no encroachment on agricultural land, full of wastes and garbage/good waste disposal, and unemployment/job opportunity.

We constructed the table 4.2 for the second inquiry. The table 4.2 shows there is no significant mean differences between 11 income groups about 10 attribute pairs of environmental quality. These are congested/ no crowding, dust from coal/clean from coal, subsidence prone/stable, violent/gentle, unhealthy/healthy, untreated chemical/celan water, smog from chimney/clean air, lowering in ground water level/unchanged groundwater, changes in river course/unchanged river course, and unemployment/job opportunity. Table 4.3 shows there is significant mean differences between five ethnic groups (SC, ST, OBC, General, and others) on three attribute pairs, viz unhealthy/healthy, smog from chimeny/clean air, and changes in river course/unchanged river course. There is no remarkable difference on the women's assessement of environmental quality whether they belong to a specific ethnic caste group or income group.

## CONCLUSION

From above discussion we conclude that the women's perception about environmental quality is very high irrespective of their income and ethnic caste groups. Our conclusion is based on sematic differential scaling method, which is biased by some degree of subjectivity. This subjectivity does not hamper the generalization of assessment of the environmental quality by women. Therefore, some degree of subjectivity should be taken into consideration during the assessment of environmental and social impacts. Women's perception/attitude assessment plays an important role for successful implementation of developmental projects/schemes. Because women are the most affected groups of targeted development. The semantic differential scale can be effectively used for assessment of women's attitudes.

## Teble 4.1

### Testing of Hypothesis for Women's Attitude level on Environmental Quality
### [$H_0$: $\mu = 3.0$ against H1: $\mu > 3.0$]

| Attributes | Mean ($x$) | Standard Deviation ($s$) | Test Statistic($t$)* | Remarks** |
|---|---|---|---|---|
| 1. Congested | 3.09 | 0.7548 | 1.63 | $H_0$ is accepted |
| 2. Dust from coal | 2.95 | 0.9604 | -0.71 | $H_0$ is accepted |
| 3. Barren | 3.07 | 0.8251 | 1.16 | $H_0$ is accepted |
| 4. Subsidence prone | 2.78 | 0.9057 | -3.33 | $H_0$ is accepted |
| 5. Violent | 2.79 | 0.8715 | -3.30 | $H_0$ is accepted |
| 6. Unhealthy | 2.89 | 0.7739 | -1.95 | $H_0$ is accepted |
| 7. Untreated chemical | 2.71 | 0.9234 | -4.31 | $H_0$ is accepted |
| 8. Smong from chimney | 2.72 | 0.8349 | -4.59 | $H_0$ is accepted |
| 9. Lowering in ground water level | 3.15 | 0.6696 | 3.07 | $H_0$ is rejected |
| 10. Changes in river course | 3.01 | 04732 | 0.28 | $H_0$ is accepted |
| 11. Encroachment on agricultural land | 3.15 | 0.6598 | 3.12 | $H_0$ is rejected |
| 12. Full of wastes and garbage | 3.19 | 0.6346 | 4.10 | $H_0$ is rejected |
| 13. Unemployment | 3.30 | 0.7605 | 5.41 | $H_0$ is rejected |

* $t = \dfrac{\sqrt{n}\,(\bar{x} - 3.0)}{s}$, $s = \sqrt{\dfrac{n}{n-1}} \times s$, $n = 189$

** Test Rule : We reject $H_0$ if $t > t_{0.05,\,188} \approx 1.64$ or $t_{0.01,188} \approx 2.32$, otherwise accept $H_0$.

## Table 4.2

### Hypothesis Testing of Mean Differences of 11 Income Groups towards Environmental Quality

[$H_0$: all group means are equal, against $H_1$: all group means are not equal]

| Attribtes | Test Statistic (F)* | Remarks** |
|---|---|---|
| 1. Congested | 1.61 | $H_0$ is accepted |
| 2. Dust from coal | 0.13 | $H_0$ is accepted |
| 3. Barren | 15.52 | $H_0$is accepted |
| 4. Subsidence prone | 0.79 | $H_0$ is accepted |
| 5. Violent | 0.70 | $H_0$ is accepted |
| 6. Unhealthy | 1.20 | $H_0$ is accepted |
| 7. Untreated chemical | 1.49 | $H_0$is accepted |
| 8. Smog from chimney | 1.55 | $H_0$ is accepted |
| 9. Lowering in ground water level | 1.21 | $H_0$ is accepted |
| 10. Changes in river course | 0.64 | $H_0$is accepted |
| 11. Encroachment on agricultural land | 2.05 | $H_0$is rejected |
| 12. Full of wastes and garbage | 2.16 | $H_0$ is accepted |
| 13. Unemployment | 1.16 | $H_0$ is accepted |

* Using analysis of variance technique we obtain test statistic (F).

** Test Rule : We reject $H_0$ is and only if $F_{5\%,10,178} \approx 1.88$ or $F_{1\%\,10,178} \approx 2.42$, Otherwise, accept $H_0$.

*Source : Lahiri-Dutt, 1999.*

**Table 4.3**

**Hypothesis Testing of Mean Differences of 5 Ethnic Caste Groups towards Environmental Quality**

[$H_0$: all group means are equal, against $H_1$: all group means are not equal]

| Attributes | Test Statistic (F)* | Remarks ** |
|---|---|---|
| 1. Congested | 1.73 | $H_0$ is accepted |
| 2. Dust from coal | 1.39 | $H_0$ is accepted |
| 3. Barren | 0.39 | $H_0$ is accepted |
| 4. Subsidence prone | 1.23 | $H_0$ is accepted |
| 5. Violent | 0.85 | $H_0$ is accepted |
| 6. Unhealthy | 2.72 | $H_0$ is accepted |
| 7. Untreated chemical | 0.95 | $H_0$ is accepted |
| 8. Smongfrom chimney | 2.44 | $H_0$ is accepted |
| 9. Lowering in ground water level | 0.0087 | $H_0$ is accepted |
| 10. Changes in river course | 0.68 | $H_0$ is accepted |
| 11. Encroachment on agricultural land | 0.71 | $H_0$ is accepted |
| 12. Full of wastes and garbage | 0.16 | $H_0$ is accepted |
| 13. Unemployment | 1.47 | $H_0$ is accepted |

* Using analysis of variance techniques we ontain test statistic (F)

** Test Rule : We reject $H_0$ if and only if $F_{5\%\ 4.\ 184}$ 2.39 or $F_{1\%4,184}$ 3.40, otherwise, accepted $H_0$.

***Source :*** *Lahiri-Dutt, 1999.*

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**Appendix 1**

| Attribute | < 500 | 501 - 1000 | 1001 - 1500 | 1501 - 2000 | 2001 - 2500 | 2501 - 3000 | 3001 - 3500 | 3501 - 4000 | 4001 - 4500 | 4501 - 5000 | > 5001 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Congested | 3.13 | 3.02 | 2.91 | 3.05 | 2.60 | 3.42 | 3.28 | 3.08 | 4.50 | 2.75 | 3.25 |
| | 0.73 | 0.78 | 0.85 | 0.61 | 0.80 | 0.59 | 0.45 | 0.76 | 0.50 | 0.43 | 0.43 |
| Dust from Coal | 2.92 | 2.81 | 2.91 | 2.84 | 2.80 | 3.42 | 2.71 | 3.00 | 4.50 | 2.75 | 3.25 |
| | 0.84 | 1.04 | 1.04 | 0.67 | 0.99 | 1.14 | 0.88 | 0.71 | 0.50 | 0.43 | 0.43 |
| Barren | 2.95 | 3.11 | 3.00 | 2.95 | 2.40 | 3.26 | 3.29 | 3.42 | 3.50 | 2.75 | 3.50 |
| | 0.79 | 0.85 | 0.95 | 0.22 | 0.80 | 0.91 | 0.45 | 0.64 | 1.50 | 0.43 | 0.50 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Subsidence Prone | 288 | 2.57 | 2.77 | 2.74 | 2.60 | 3.00 | 2.86 | 3.17 | 3.00 | 3.25 | 2.50 |
| | 0.77 | 1.05 | 0.90 | 0.78 | 0.80 | 0.79 | 0.98 | 0.37 | 2.00 | 0.43 | 0.87 |
| Violent | 2.84 | 2.68 | 2.82 | 2.89 | 2.60 | 2.89 | 3.00 | 2.67 | 2.00 | 3.25 | 2.75 |
| | 0.84 | 0.94 | 0.89 | 0.55 | 0.49 | 0.912 | 0.93 | 0.85 | 1.00 | 0.43 | 1.08 |
| Unhealthy | 2.84 | 2.77 | 2.68 | 2.95 | 2.40 | 3.26 | 2.71 | 3.17 | 3.50 | 2.75 | 3.50 |
| | 0.87 | 0.81 | 0.70 | 0.61 | 0.80 | 0.78 | 0.88 | 0.55 | 1.50 | 0.43 | 0.50 |
| Untreated chemical | 2.82 | 2.48 | 2.63 | 2.84 | 2.40 | 2.78 | 2.71 | 3.17 | 3.50 | 2.50 | 2.75 |
| | 0.88 | 0.99 | 0.88 | 0.67 | 0.80 | 1.05 | 0.88 | 0.55 | 1.50 | 0.87 | 0.43 |
| Smog from chimney | 2.89 | 2.68 | 2.68 | 2.89 | 2.80 | 2.89 | 3.28 | 3.00 | 4.50 | 2.50 | 3.25 |
| | 0.55 | 0.88 | 0.92 | 0.72 | 0.98 | 0.78 | 0.70 | 1.00 | 0.50 | 0.87 | 0.43 |
| Lowering in ground water level | 3.21 | 3.18 | 3.05 | 2.95 | 3.00 | 3.26 | 3.29 | 3.33 | 3.00 | 3.25 | 250 |
| | 0.47 | 0.67 | 0.88 | 0.51 | 0.00 | 0.71 | 0.45 | 0.47 | 2.00 | 0.43 | 0.87 |
| Changes in river course | 3.05 | 2.96 | 3.00 | 3.05 | 2.60 | 3.05 | 3.14 | 3.00 | 3.00 | 3.00 | 3.25 |
| | 0.22 | 0.54 | 0.67 | 0.22 | 0.80 | 0.22 | 0.99 | 0.00 | 0.00 | 0.00 | 0.43 |
| Encroachment on agricultural land | 3.21 | 3.11 | 3.22 | 3.05 | 3.00 | 3.37 | 2.71 | 3.00 | 4.50 | 3.25 | 2.50 |
| | 0.47 | 0.60 | 0.90 | 0.39 | 0.63 | 0.67 | 0.70 | 0.71 | 0.50 | 0.43 | 0.87 |
| Full of wastes and garbage | 3.08 | 3.17 | 3.23 | 2.89 | 2.80 | 3.58 | 3.43 | 3.33 | 4.00 | 3.00 | 3.50 |
| | 0.53 | 0.66 | 0.60 | 0.45 | 0.98 | 0.67 | 0.50 | 0.62 | 0.00 | 0.00 | 0.50 |
| Unemployment | 3.26 | 3.37 | 3.64 | 3.16 | 3.40 | 3.05 | 3.29 | 3.08 | 2.50 | 3.50 | 3.50 |
| | 0.59 | 0.85 | 0.83 | 0.49 | 0.80 | 0.76 | 0.45 | 0.86 | 0.50 | 0.87 | 0.50 |

## Appendix 2

### The Sementic Difference Score Mean ($x$) [first entry] & Standard DEviation (s) [second entry] of 5 Ethnic Caste Groups about Environmental Rating

| Attibutes | SC | ST | OBC | General | Others |
|---|---|---|---|---|---|
| Congested | 3.17,0.67 | 2.95,0.98 | 2.87,0.84 | 3.19,0.45 | 3.50,0.50 |
| Dust from coal | 2.86,0.91 | 2.97,0.86 | 2.95,1.18 | 3.23,0.81 | 3.00,0 |
| Barren | 3.08,0.78 | 3.00,0.87 | 3.10,0.92 | 3.20,0.62 | 3.50,0.50 |
| Subsidence prone | 2.84,0.97 | 2.79,0.71 | 2.55,1.05 | 2.96,0.59 | 3.00,0 |
| Violent | 2.75,0.87 | 2.79,0.81 | 2,67,0.96 | 2.93,0.79 | 3.50,0.50 |
| Unhealthy | 2.78,0.80 | 2.75,0.77 | 2.90,0.66 | 3.19,0.58 | 3.00,0 |
| Untreated chemical | 2.64,0.92 | 2.58,0.95 | 2.60,1.04 | 2.91,0.77 | 3.00,0 |
| Smog from chimney | 2.90,0.81 | 2.71,0.84 | 2.63,0.97 | 3.11,0.60 | 3.50,0.50 |
| Lowering in ground water level | 3.14,0.62 | 3.21,0.58 | 3.12,0.75 | 3.15,0.66 | 3.00,0 |
| Changes in river course | 3.16,0.43 | 2.79,0.71 | 3.00,0 | 1.99,0.15 | 3.50,0.50 |
| Encroachment on agricultural land | 3.21,0.65 | 3.00,0.58 | 3.12,0.46 | 3.13,0.68 | 3.50,0.50 |
| Full of wastes and garbage | 3.19,0.72 | 3.18,0.62 | 3.15,0.61 | 3.24,0.52 | 3.00,0 |
| Unemployment | 3.38,0.74 | 3.37,0.70 | 3.25,0.80 | 3.06,0.60 | 3.50,0.50 |

REFERENCES

Barrow, C.J. (1997) Environmental and Social Impact Assessment an Introduction, Arnold, London.

Burgess, Jacquelin A. (1998) Image and Identity: A Study of Urban and Regional Perception with Particular Reference to Kingston upon Hull, Occasional Papers in Geography No. 23, University of Hull, Leeds, pp. 21-22.

Downs, R.M (1970) Geographic Space Perception : Past Approaches and Future Prospects, Progress in Geography, Vol.2, Edwards Arnold, London.

Heisse, D.R.(1970) The Semantic Differenctial and Attitude Research, In Summers, G.F. (ed), Attitude Research, Reid McNally, Chicago.

Henerson, Marlene, E.,Morris, L.L.and Fitz-Gibbon, C.T. (1987) How to Measure Attitudes, Sage Publications, New Delhi, pp 89-91.

Gilpin, A (1995) Environmental Impact Assessment (ELA), Cambridge University Press.

Golant S. and Bunton, I. (1969) The Meaning of a Hazard : Applications of the Semantic Differential, Natural Hazard Research Working Paper, No.7, DEpt.of /Geography, Universiry of Toronto.

Goon, A.M., Gupta, M.K., and Dasgupta, B.(1983) Fundamentals of Statistics, Vol-1 & 2, The World Press Private Ltd., Calcutta.

Kasman, J.V. (1970) The Development of a Usable Lexicon of Environmental Descritpors, Environment and Behaviour, 2, pp 153-169.

Lahiri-Dutt, K. (1999) Mining Development and its Impact on the Environment : Role and Preception of Women in the Reniganj Coalbelt of Burdwan District (W.B), Unpublished Final Technical Report (no.19/28/93-RE), Ministry (of) Environment & Forests, Government of India, New Delhi

Lowenthal, D. (1961) Geography, Experience and Imagination. Towards a Geographical Epistemology, Annals of the Association of American Geographers, 51, pp. 241-260.

Osgood. C.E., Suci G.J. and Tannenbaun, P.H (1957) The Measurement of Meaning, Urbana, Illinois

Premi, K.K., Nuna, S.C. and Menon, P (1994) Source Book on Environmental Educatioon for Elementary Teacher Educators, National Institute of Educational Planning and Administration, New Delhi.

Singh, J.P. and Tiwari, S.C. (1980) Man and his Environment, Concept publishing Company, New Delhi.

Smith, L.G. (1992) Impact Assessment and Sustainable Resources Management, Longman Scientific & Technical, USA.

Warr, P.B. and Knapper, C. (1998) The Perception of perople and Events, Wiley, London.

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