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PROSPECT OF FOREST BASED INDUSTRIES IN JHARGRAM SUBDIVISION OF MEDINIPUR DISTRICT, WEST BENGAL THROUGH SUSTAINABLE MANAGEMENT OF FOREST RESOURCES

Narayan Chandra Jana
Population Education Resource Centre, Burdwan University
Burdwan 713 104

Abstract

In the present juncture of increasing population in the Jhargram Subdivision of Medinipur district the forest resources are considered as a certain alternative source of economy. The soils of the lateritic and semi-lateritic tracts of the greater part of this subdivision are poor in nutrients and suffer from drought condition every year. Hence the economy of the poor tribal people can not continue to rely upon the uncertain and inadequate production of agricultural crops forever. Under these circumstances possibility of the development of forest based industries in the rural and urban sectors of this geographical area through sustainable management of forest resources has been explored. With references from existing instances, types of forest products and development possibilities of small-scale industries thereby have been identified and explained.

Introduction

With the increase of human and animal population, the need for forest products has increased manifold. Today rural development in some cases is found to have been certainly linked with the development of forests. Hence expansion and utilisation of this green wealth require a sound management towards sustainable economic development.

Objective of the Study

Being situated in the rural backward sector of West Bengal the study area has a poor agro-based economy. In most parts of this sector the agricultural activities suffer from adverse environmental problems in respect of both topography and climate. Topographic problems are largely associated with infertile lateritic soils often suffering from gully erosion and low organic content, while climatological problems are particularly reflected with drought, flash floods and fluctuating sub-surface water table conditions.

A formidable part of Jhargram Subdivision is covered with forests (Figure 1). Occurrence of several constraints to the existing agricultural practices, as mentioned earlier and inefficient use of available forest resources give rise to increasing unemployment among the local people. Consequently, growing frustration among the young generation not only gives rise to social and cultural problems but also provoke them for undue interference in the reserve forests causing deforestation particularly along the marginal areas of the forest lands. This paper is an attempt for exploring possibilities of the development of forest-based industries through efficient use and appropriate management of forest resources, which in turn can generate employment opportunities in this area on the parallel line of agricultural development.

The Study Area

Geographically the Jhargram Subdivision of Medinipur district of West Bengal falls within the undulating tract of *Rarh Bengal* lying between 22°00′N to 22°51′6″N latitudes and 86°32′30″E to 87°14′24″E longitudes. Representing an extension of Chotanagpur Plateau it includes the blocks of Binpur-I and Binpur- II, Jamboni, Jhargram, Sankrail, Nayagram, Gopiballavpur-I and Gopiballavpur-II and altogether covers an area of about 2959.47 km^2.

Physical Setup

Geology: The major geological formation of this subdivision is lateritic, which occupies the central as well as the southern parts of this area, whereas the eastern part gradually gives way to the alluvium of the Lower Ganga Plain. The formation of laterites shows beds of gravels, grits and sands of Tertiary age. It may also be pointed out that in the continuous sheet of lateritic formation intervening alluvial patches are present (O'Malley, 1911). Strongly folded mica-schist, phyllites and epidiorites of Archaean age cover the extreme northwestern portion. Majority of the visible surface is gravelly, pisolitic and nodular in character.

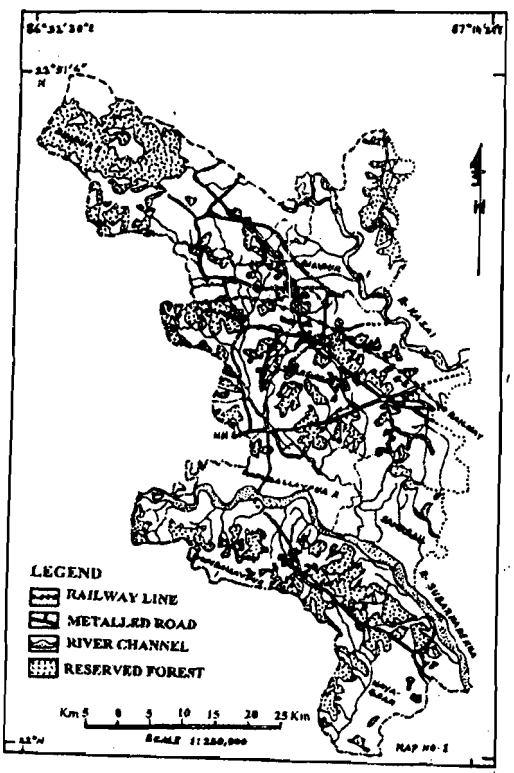

Figure 1: The extent of Reserved Forests in the Jhargram Subdivision of Medinipur District

Topography: It has already been mentioned that the area is an extension of Chotanagpur plateau. Therefore the topography slopes to the east-southeast. In the northwestern part the

elevation is above 250m whereas in the extreme southeast as well as in the river valleys it is below 50m.

Drainage: River Kansabati, River Subarnarekha and Dulung, the tributary of Subarnarekha drain the area from northwest to southeast. River Kansabati flows through the eastern part of this subdivision whereas River Subarnarekha through its southern part.

Climate: The climate of this area in general is characterised by warm-humid tropical monsoon type. This area experiences Aw type of climate according to Koppens's classification with wet and dry seasonal conditions.

Soil: The soil of this area can broadly be grouped into five major types *viz.* lateritic, red sandy, red gravelly, older and newer alluvial, among which lateritic soil is predominant. Newer allvial soils occur along the river valleys as they spill over during the rainy season.

Indigenous Flora: The major part of this area possesses a flora typical to those of Chotonagpur Plateau of the west. Some parts remain almost entirely waste while other parts contain jungles of Sal, Piasal, Kusum and the like (Jana, 1998).

Socio-economic Attributes and the Existing Environmental Problems

It has been mentioned earlier that the study area remains markedly backward having agro-based economy of subsistence type. According to 1991 Census the area is quite well populated, having a total population of 882,651. A large proportion of the inhabitants is of tribal communities and has their occupation as agriculture. Owing to the infertile soil condition and poor sub-surface reserve of water agriculture is often hindered and there is almost no possibility of double or multiple cropping. From the study of 1971, 1981 and 1991 Census records it has been found that the percentage of non-workers continued to increase.

It has already been mentioned that soil erosion, drought and hazards of flash floods are the significant physical environmental problems of this area. Throughout the undulating terrain processes of soil erosion, mainly through rills and gullies, capture a large area encroaching upon the agricultural lands. Although this area very rarely get submerged by flood waters, in some years torrential spells of rainfall create high flash floods leading to severe damage of properties and crops. The meteorological data of Medinipur Sadar and Jhargram reflect high probability of droughts, which result in agricultural drought-like conditions (Das and Sen, 1990). This situation necessitates shifting of emphasis from the agricultural sector to the development of other alternatives.

Assessment of the Existing Forest Resources and Forest-based Industries

An extensive area (18% of the total geographical area) of this subdivision is under forest cover. Binpur-I and Binpur-II, Jhargram and Nayagram blocks share major forest covers while the other blocks posses considerable coverage.

The area is largely covered with jungles consisting of Sal *(Shorea robusta)* or of a mixed forest in which species like Priyangu *(Aglaia)*, Kusum *(Carthamus tinctorius)*, Ghanta Parul *(Schrebera)*, Bahera *(Terminalia belarica)* and similar other trees with a variety of shrubs and climbers are conspicuous.Practically the entire forest tract bears a pure coppice crop of Sal with a sprinkling of associates like Mahua *(Madhuka latifolia)*, Arjun *(Terminalia arjuna)*, Bel *(Aegle marmelos)*, Palas *(Butea frondosa)*, Simul *(Salmalia malabarica)*, Gandharaj *(Gandenia gummifera)*, Kul *(Ziziphus jujuba)*, Kutus *(Lantana camara)*, Mango *(Mangifera*

indica), Neem *(Azadirachta indica)*, Babla *(Acacia arabica)*, Siris *(Albizzia lebbek)*; herb-like Satamuli *(Asparagus recemosus)* and grass-like Gandhabena *(Chrysopogon)*. The commonest climbers are Lata-Palas *(Butea superba)*, Khamalu *(Dioscoria spp)*, Amal Lata *(Vities trifolia)* etc. (Govt. of West Bengal, 1974-75, 1984-85, First Working Plan, Vol. I).

The major forest products of the area include timber, pole, fuel-wood, wood-pulp etc. Whereas the minor products include Sal seeds, Mahua seeds and flowers, Kend leaf, Lac, Tessar and others.

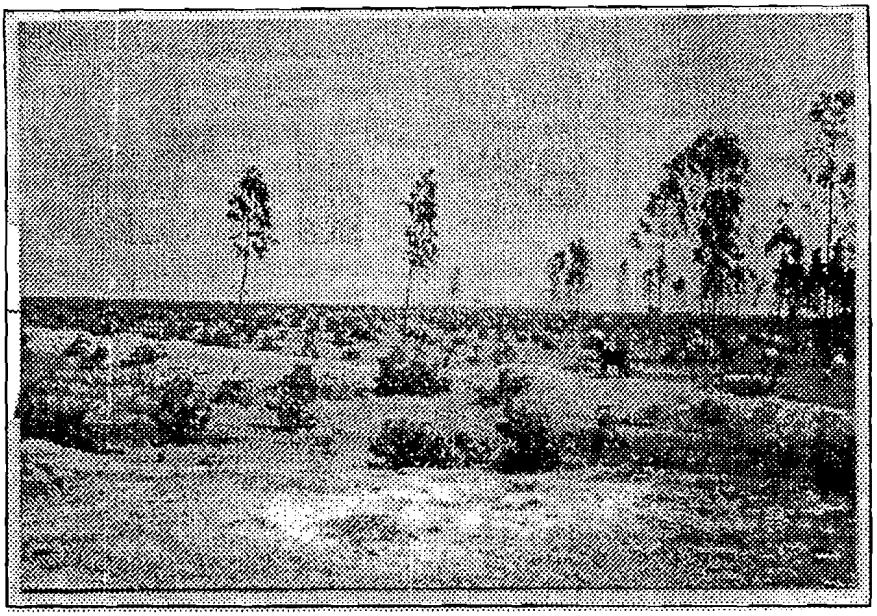

Plate 1: Recently planted of Sal saplings upon the degraded lateritic tract of Nayagram Block

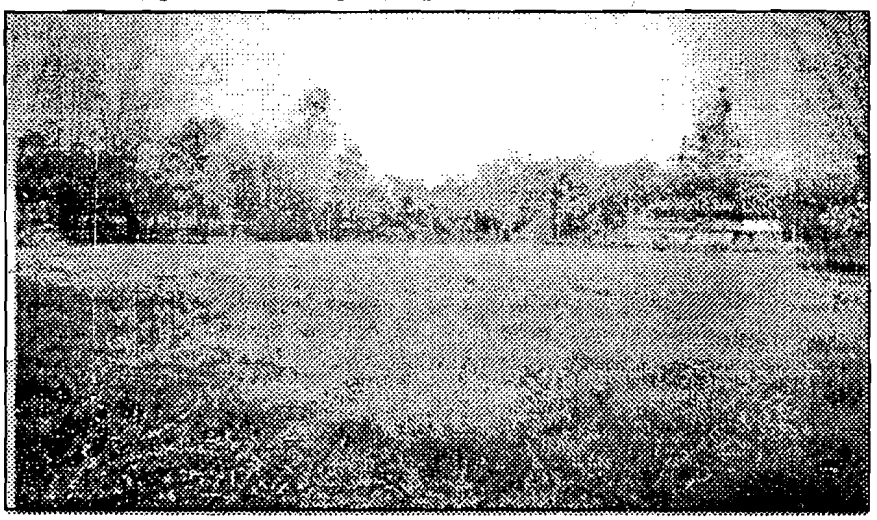

Plate 2: Babui grass, a major ingredient for cottage industry, in harvesting stage in Nayagram Block

The timber products called as 'poles' are procured mainly from Sal, Peasal, Teak, Siris, Mango, Asan, Neem, Arjun and Mahua. A major portion of the procured poles is sold in the range of 6-12cm diameter at breast height (d.b.h.) in mixed forests and upto 5cm. (d.b.h.) in case of Sal forests (Roy Mukherjee, 1995). Table 1 below gives the statement about the production of high and medium volume forest area.

Table 1: Production of timber of different forest areas within the West Medinipur Forest Division (yield/hectare)

Nature of Forest Area	Coverage/Production
I High Volume Area	
1. Area of Sal stratum	70,667.30 hectares
2. Extent of high volume area (13%)	9,187.00 hectares
3. Extent of workable area (95% of high volume area, 5% has been kept as reserved for silvicultural and technical reasons)	8,728.00 hectares
4. Rotation	12 years
5. Annual cut area	727 hectares
6. Vol./ha	30 m^2/ hectares
7. Annual yield of production	21,810m^3
II Medium Volume Area	
1. Medium vol. Area (25%)	17,667 hectares
2. Extent of workable area	16,784 hectares
3. Rotation	12 years
4. Vol./ha	30m^2/ hectares
5. Annual yield	4,197m^3

Source: Forest Survey of India, 1983

The above table demonstrates that in the West Medinipur Forest Division as a whole the yield of production is quite significant and the area has a further scope of regeneration if proper management measures are taken. Table 2 below gives the year-wise returns of forest products of the West Medinipur Forest Division.

Table 2: Year-wise returns of revenue from the forest products

Year	Timber (Rupees worth)	Firewood (Rupees worth)	Minor Forest Products (Rupees worth)	Others (Rupees worth)	Total (Rupees worth)
1985-86	41,000	4,204,000	66,000	409,300	4,721,000
1986-87	73,000	2,106,000	297,000	340,000	2,816,000
1987-88	35,000	813,000	341,000	310,000	1,499,000
1988-89	119,000	486,000	251,000	397,000	1,253,000
1989-90	835,000	1,751,000	240,000	1,028,000	3,854,000

Source: Directorate of Forest, Govt. of West Bengal

Keeping in view the diversified forest resources, significant forest products and future scope of regeneration the study area has a promising prospect of forest-based industries. But

till today forest based industries have not developed. A few forest-based industries developed so far are concentrated only in certain pockets. In Jhargram block there are only two paper mills giving employment to a quite considerable number of working population.

Development of forest-based industries needs properly organised commercial exploitation of forest resources. However, without management practices such attempt would only irrational deforestation leading to environmental degradation. So management of the forest resources is absolutely essential to maintain an ecological balance and ensure a constant flow of raw materials to the industries concerned.

Proposed Forest-based Industries

Depending upon the availability of a wide range of forest resources like Sal leafs, Cashewnut, Neem fruit, Mahua flower, Babui grass, Kend leaf and others there is ample scope for the development of other forest-based small scale industries. The following small-scale cottage industries can be set up in this sector with full vigour.

- *Sal-leaf utensils* - this has heavy demand in the adjoining region, district towns of Medinipur and also in the market of the Calcutta Metropolitan region.
- *Bidi-making* - Bidi-making from Kend leaf to meet the needs of the local people of the backward region, especially the western fringe areas of this state.
- *Neem-soap making* using the oil extracted from Neem fruit
- *Cultivation of mashroom*, as a substitute of protein diet, using the straw grown in the forests.
- *Preparation of Sopha sets, bags and others* using Babui grass - this has already been introduced (appointing local people) by the Rural Development Centre, Kharagpur.
- *Collection and processing* of honey by scientific method.
- *Making sports accessories* using bamboo and other wood (Nayagram and Sankrail blocks produce a large quantity of bamboo).

Concluding Remarks

In order to give an encouragement and momentum to the above mentioned forest-based industries infrastructures on Government level may be developed by a) inviting more people to Participatory Forest Management (proper use of the existing forest resources with the active participation of the local people), b) encouraging Joint Forest Management Schemes (sharing of products, responsibilities, control and decision-making over forest lands between the forest departments and the locals) and c) developing market centres for selling and exporting the forest products.

It may be said without doubt that rational management of forest resources towards the development of forest-based industries on the parallel line of agricultural development will be a boon to sound sustainable economy to rural people in general and the tribal poor communities in particular of this economically backward area of West Bengal.

Acknowledgement

The author is grateful to Professor Guru Prasad Chattopadhyay, Head of the Department of Geography and Environment Management, Vidyasagar University for his valuable editorial advice on the manuscript.

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ENVIRONMENTAL STRESS AND THE URBAN POOR: THE INDIAN SCENARIO

A Ramanathan
Department of Humanities & Social Sciences
Indian Institute of Technology
Mumbai 400076
&
Sumana Bandyopadhyay
Department of Geography & Environment Management
Vidyasagar University
Medinipur 721102

Abstract

Urban India epitomises the problems of sustainability as the excessive population pressure leads to a gross inadequacy of infrastructure and basic amenities. The minimum conditions of well being remain inaccessible for a large proportion of the urban population – this condition leads to an ever-increasing environmental stress, which affects the urban poor and thus mitigates the impact of sustainable solutions. In this context, the paper discusses some issues of amenities, giving an overview of slum development, water supply and sewerage conditions that enhances environmental stress for the urban poor. It emerges that statistics often do not take into consideration those pockets of the city that contribute mostly to poor living conditions. In this context sustainable solutions should first seek to define the criteria for identifying the poorest urban pockets and then go on to structural changes and participatory management.

Introduction

Over the centuries, cities have been recognized as centers of economic, social technological and cultural progress. The entire credit for progress goes to mankind and the innovations that have fostered progress – but we must also acknowledge that much of this progress is responsible for the urban crisis that we are faced with. While most advanced countries have come to terms with the crisis and are trying to impose strictures by way of environmental laws, the problem has adopted a critical form for urban areas of developing countries. Here, some societies are at the take-off stage, experiencing a population influx, wrought with lack of adequate resources and infrastructural support. The most crucial problems of cities today are poverty, blight, congestion, pollution and high rates of crime – not necessarily in that order.

In the Indian context, urban conditions are no different. It is a fact that conditions of poverty and pollution together create a volatile situation for the common man on the street. Zeroing in on the poorest section of the urban population, we may find that it is this section that suffers the ultimate environmental stress.

This study attempts an analysis of the causal relationship between urban poverty, the conditions of basic amenities and how this relationship causes immense environmental stress in cities. The paper highlights the basic issues of poverty and the present condition of

urbaninfrastructure in India while discussing some issues that create the condition of environmental stress for the urban poor, highlighting two critical areas, that of slum development and water supply and sewerage facilities, which need to be prioritized by planning and development authorities.

It is evident that the concept of environmental sustainability must be the foremost issue for urban planning in India, most critically for metropolitan cities.

Sustainable Urban Development

Sustainable development is an elusive concept, its definition implies development based on renewable resources used at a rate, which may be regenerated – the elusive aspect is the information about the extent of resource availability.

The term sustainable development brings together two strands of thought about the management of human activities – one concentrating on development goals, the other on controlling or limiting the harmful impacts of human activities on the environment.

Among the first considerations of possible links between global economic growth and natural resource scarcity was the report *"Limits to Growth"* published by the Club of Rome in 1972. Another pioneering work was the book *"Only One Earth"* by Barbara Ward and Rene Dubos, also published in 1972, which described the concerns that led to the 1972 United Nations Conference on the Human Environment in Stockholm. The definition of sustainable development used by Our Common Future in 1987 draws from this earlier book. The most widely cited definition of sustainability is that of the World Commission on Environment and Development (WCED) also known as the Brundtland Commission, which submitted its Report, *"Our Common Future"* in 1987, (p.43):

Sustainable development is development, which meets the needs of the present without compromising the ability of future generations to meet their own needs.

A diversity of views is provoked by the concept of urban sustainability.

*"**Sustainable urban development** must aim to produce a city that is 'user-friendly' and **resourceful, in terms not only of its form and energy efficiency, but also its function, as a place for living.**"* (Elkin, McLaren and Hillman, 1991, p.12)

As an essentially human artifact, the sustainable city needs more than just ecological balance at all these geographical scales but also sustain its own contribution to the environment, particularly its built form.

Environmental stress on the urban poor - what causes it?

The rural poor in India have till now outnumbered the urban poor, but by the turn of this century, this relationship could well be reversed. The urban population rose by 450 million between 1975 and 1985 and demographers expect that by 2010, some 52% of the population of developing countries will live in urban agglomerations as compared to 37% in 1990. Although urbanization was initially propelled by industrialization, natural increase has also proved to be substantial. Manufacturing industries, services and commercial centers have been surrounded by squatter settlements having poor health and sanitation conditions. An estimated 600 million urban dwellers in the developing world live in threatening circumstances. The inappropriate use of land by dense housing without the provision of

required sanitation and refuse disposal systems creates conditions of environmental stress. Such spatial entities are identified with the concepts of slums and *ghettos.*

R.J. Johnston is of the opinion that the term *ghetto* is a classic geographer's concept. The term was originally used for Jewish Population in European cities and later in North American cities. It now implies any ethnic concentration within a city. The fact that ghettos are characterized by conditions of environmental stress may be clarified by the conclusions made by Johnston & Poulsen, who states that the ghetto implies three fundamental features:

1. Spatial concentration of members of an ethnic group within the city.
2. Continuity of this concentration over several generations.
3. Sustained institutional prejudice and discrimination against the group generating spatial concentration.

It is the third point that causes more concern – for overall development in the spatial context, the most important players are the institutions.

Urban Poverty Scenario

According to the 1991 Census, the percentage of urban population to the total population is in the order of 25.72%, which is 217.17 million in absolute numbers; the decadal increase in urban population is 36.19% in comparison to rural increase of 19.72%.Table No. 1 shows the summary picture highlighting urban population of India.

Table 1: Proportions of rural and urban population in India and their growth during 1981-1991

Total Population:	**844.32 million**
Rural Population	627.15 million
Urban Population	217.70 million
Percent Rural	74.00%
Percent Urban	25.72%
Absolute Increase during 1981-1991	**161.00 million**
Rural Population	103.28 million
Urban Population	57.72 million
Decadal Increase during 1981-1991	**23.56%**
Rural Population	19.72%
Urban Population	36.19%

Source: Compiled from Census of India Reports: 1981,1991.

The incidence of poverty in India has declined over the years – from around 54.9% in 1973-74 to 36% in 1993-94, but the rural urban poverty ratios reveal that the gap has been largely reduced and in the near future, the urban poor will be more in numbers than the rural poor Table 2 reveals the picture – in 1973-74, rural poverty ratio was 56.4% while for urban areas it was 49%, but in 1993-94 it is 37.3% and 32.4% respectively.

Table.2. Changing Trend of Proportion of Population Below Poverty Line

Year	Rural		Urban		Combined Total	
	Population (millions)	Poverty Ratio (%)	Population (millions)	Poverty Ratio (%)	Population (millions)	Poverty Ratio (%)
1973-74	261	56.4	60	49.0	321	54.9
1977-78	264	53.1	65	45.2	329	57.3
1983-84	252	45.7	71	40.8	323	44.5
1987-88	232	39.1	75	38.2	307	38.9
1993-94	244	37.3	76	32.4	320	36.0

Source: Economic Survey 1998-99, Ministry of Finance (Economics Division), Govt. of India

As far as the regional disparity of urban poverty is concerned, the pressures are severe in the states of Bihar, where 30% of the population is below the poverty line. Table No. 3 reveals that in Uttar Pradesh it is 27.2%, Andhra Pradesh (26.1%), Karnataka (24.2%), Orissa (24.1%), Madhya Pradesh and West Bengal are at 21.3% and 20.7% respectively.

Table.3. Selected States Ranked by Incidence of Poverty

	States	% BPL		States	%BPL		States	% BPL
1	Bihar	30.0	6	M.P.	21.3	11	Gujrat	12.9
2	U.P.	27.2	7	W.Bengal	20.7	12	Haryana	11.7
3	Andhra P	26.1	8	Tamilnadu	20.5	13	Assam	9.4
4	Karnataka	24.2	9	Rajasthan	19.4	14	Punjab	7.2
5	Orissa	24.1	10	Maharastra	17.0	15	Himachal Pr.	2.4

Source: Economic Survey 1998-99, Ministry of Finance, Govt.of India.

The proportion is comparatively low in the states of Maharashtra, Gujarat, Haryana and the lowest in Punjab and Himachal Pradesh. States like Tamil Nadu, Kerala etc. achieved substantial reduction in poverty levels by the late Eighties. What needs to be examined here is whether the incidence of urban poverty in these states is a result of rapid urbanization and population growth or the consequence of the inability to manage the incremental urban population in an effective way. In reality, it is a combined effect of both. The other important debate about regional disparities of urban poverty is whether urban poverty is an outflow of poverty from the rural areas.

Basic Amenities & the Urban Poor

The issue of provision of basic amenities for urban areas, especially for the poor, poses a major problem in the process of urbanization in India. There is little point in seeking comfort from the premise that India lives in its villages, when the urban population is 217 million and the number of cities and towns is well over 5000.

One of the ways of ascertaining the availability of basic services to the poor is to relate it to the size of population residing in slums and squatters, for slums by definition are a manifestation of inadequacy of basic facilities. Three major indicators that cause environmental stress for the urban poor have been selected for discussion, namely, - slum development, water supply and sewerage conditions.

In this view, the key ingredients for the urban sector are:

1. Eradication of poverty to prevent the condition that forces people to sustain themselves in inadequate living conditions – this calls for changes in the socio-political structures.
2. Appropriate technologies to mitigate environmental degradation – this implies investment in research and development.
3. Reducing the population influx to reduce pressure on limited resource and infrastructure – achieving this is possible by development of the peripheries to create opportunities so that

Housing the Urban Poor: Slum Development:

The most critical aspect of studying slum development is at its root, in its definitional confusion. There is the problem of non-conformity of the available information and also the fact that due to lack of an explicit definition, the delineation of slums has differed from city to city. The NSSO 31st Round Survey conducted in 1976-77 reveals that the largest slum population was found in Bombay (Mumbai), followed by Calcutta, Delhi, Madras (Chennai) in the descending order.

It is important to consider the primary activities of the city dwellers in order to find out the incidence of slum population, it is generally noted that a greater proportion of population engaged in informal sector of the economy implies lower levels of income. This essentially reduces the affordability and accessibility for land and proper housing – healthy accommodation with adequate infrastructural support. This increases the possibilities of slum development. The other causal factor apart from low-income levels is the reality of a severe shortage of housing itself – this causes slum development even if there is sufficient income. It has been noted by urban geographers that in the initial stages of urban development, industrialization and commercialization leads to an increased level of inequality in the urban sector with regard to accessibility to housing. This phenomenon is said to reduce at a later stage when the economic conditions improve substantially.

The shelter characteristics of the urban poor are difficult to determine but by and large, the fact remains that the residential structures are high-risk ones from the point of view of environmental health. The composite nature of impacts of inadequate housing conditions of the slums actually range from likelihood of structural collapse due to storms, inflammable material used for housing like straw, plastics etc. to the concentration and spread of disease vectors due to lack of sanitary facilities. It is estimated according to the Handbook of Housing Statistics, NBO, that a mere 4-6% of the urban poor live in permanent structures. The remaining majorities live in high-risk structures and besides, in many cases do not have tenural rights, as they own the structure they build but not the land on which it is built – and under the law they occupy the land illegally and may be made to vacate the premises for public requirement.

Provisions for housing is an integral part of the Five Year Plans as an important objective and several policy initiatives have been taken in this regard – mostly in the area of legislation and institutional arrangement like the Urban Land Ceiling Act of 1976 and the State Level Rent Control Act. Other initiatives have been taken to support housing for the economically

weaker sections and low-income groups directly – through housing, slum improvement and upgrading projects. The most important change that may be noted in the policy development over the years is that the limited objectives of housing availability have now given way to holistic strategies to reduce poverty and generate employment, but accessibility is still a critical problem.

The most important issue here is the definition of slums and the proper identification of the families that fall under this category of inadequate housing and sanitary conditions.

Overview of water supply & Sewerage conditions

The status of basic amenities like water supply and sewerage conditions determines the basic standard of living. The inadequacy of these basic services causes environmental stress especially for the urban poor who are deprived of adequate facilities.

The urban population covered by protected water supply was 72.25% in 1981 and increased to 90.60% as in Table 4 – the cause of concern, is the quality of drinking water that is being made available. The sanitation conditions in urban areas is a major area which requires prioritisation in the planning process as prevailing sanitation conditions have a direct impact on the health and well being of the population that is exposed to it. There has been an effective improvement in the conditions from 1985 as the population covered by proper sanitary facilities was only 28% in 1985 and according to the statistics, has notably improved to 49.3% in 1997. The figures of the rural conditions simply show how neglected this sector continues to remain. Even in urban regions, a mere 49% of the population benefits from access to adequate sanitary conditions, thus leaving a good 51% to deal with the health hazards of poor conditions or even non-availability of any kind of sanitation facility.

Access to adequate sanitary facilities is directly related to well being - the absence of it is related to the roots for growth of any number of disease vectors which gives rise to hazardous conditions. It is a primary cause of environmental stress among the poorest sections of the population.

Table 4: Population served with drinking water & sanitation
(As percentage of total population covered)

Year	Drinking Water (Rural)	Drinking Water (Urban)	Sanitation (Rural)	Sanitation (Urban)
1985	56.30	72.90	0.70	28.40
1990	73.90	83.80	2.40	45.90
1995	82.80	84.30	3.59	47.90
1997	86.74	90.60	6.37	49.3

Source: Economic Survey: 1998-99, Govt. of India

The Decade Programme of 1981 was supposed to cover the entire urban population by 1991. The Eighth Plan estimated coverage to be 84.9% in 1992, on the other hand the Economic Survey of the Govt. of India shows a figure of 84.3% in 1995, this reveals the confusion presented by statistics at different levels. Table 5 reveals the urban population covered by water supply system over the years 1981-1989 for various States & Union Territories. It may be noted that it is primarily the States & U.T.'s with lesser population have achieved better results. The deviation is seen in certain economically backward North-

Eastern States like Mizoram, Meghalaya, Tripura Assam and some others like Orissa. Mizoram is a state with critical problems of water supply as over the Eighties decade it has improved its condition to presently cover a mere 18.36% of the population which is remarkable low considering its less dense population and that certain states with similar population densities have achieved better results. States like Gujarat, Karnataka, Maharashtra seems to have taken the lead in improving conditions over the decade, a more interesting picture could have been derived with availability of the data of the current decade. The primary concern, however, is the fact that water availability must be seen in the perspective of adequacy in terms of quality – safe and potable drinking water. This is an issue to be prioritized as the population pressures in most metropolitan cities are creating an irreversible impact on the ground water in terms of depletion as well as pollution.

Table 5: Population served with water supply system in urban areas
(As a percentage of total urban population of respective states)

Sl. No.	States	1981	1985	1987	1988	1989
1	Andhra Pradesh	55.33	52.09	62.42	62.42	71.75
2	Arunachal Pradesh	47.61	88.46	100	100	100
3	Assam	25.89	37.53	37.53	37.35	37.53
4	Bihar	63.42	59.44	63.38	63.58	69.77
5	Goa	93.75	81.85	79.91	81.45	83.33
6	Gujarat	88.94	83.14	93.61	93.35	91.87
7	Haryana	39.97	69.09	100	100	100
8	Himachal Pradesh	100	89.07	92.87	100	100
9	Jammu & Kashmir	97.61	86.61	94.96	94.98	95.50
10	Karnataka	88.81	81.17	94.88	98.72	99.60
11	Kerala	59.73	64.50	63.81	65.61	68.21
12	Madhya Pradesh	67.06	79.68	80.00	80.48	81.00
13	Maharashtra	94.89	87.04	89.98	99.70	99.70
14	Meghalaya	24.89	22.14	19.35	49.47	47.49
15	Mizoram	8.19	7.57	18.65	18.57	18.36
16	Orissa	34.40	38.10	37.11	37.11	37.80
17	Punjab	65.61	71.16	71.28	71.17	71.18
18	Rajasthan	56.13	56.00	56.06	54.53	98.59
19	Sikkim	46.15	89.02	55.88	67.12	69.33
20	Tamil Nadu	80.86	83.74	86.66	88.24	88.51
21	Tripura	48.67	51.50	53.19	53.19	53.19
22	Uttar Pradesh	70.30	70.09	69.29	69.29	69.99
23	West Bengal	60.01	63.65	67.10	68.29	69.34
24	Andamans	100	100	100	100	100
25	Chandigarh	94.11	100	100	100	100
26	Delhi	81.48	98.12	97.08	96.98	97.19
27	Pondicherry	56.96	76.30	100	100	100

Source: Centre for Public Health, Ministry of Urban Development, 1990

Table 6 reveals the status of water supply in Metro cities. The coverage was 100% in Hyderabad, Bangalore and Lucknow, 99% for Mumbai, 96% in Delhi, the lowest coverage is

seen to be in Nagpur 75%. Incidentally the statistics seem to be a little confusing if one considers the pockets of unauthortised slum concentrations in these urban regions.

Table 6: Status of water supply in Metro Cities.

Sl.No	City	Total Water Supply (Mld.)	PerCapita Water Supply	Population Covered (%)
1.	Mumbai	2143.0	207.8	99
2.	Delhi	1848.0	258.0	96
3.	Calcutta	976.1	226.7	95
4.	Hyderabad	652.5	241.6	100
5.	Ahmedabad	477.0	200.1	90
6.	Bangalore	435.0	113.9	100
7.	Kanpur	407.0	307.0	75
8.	Lucknow	277.0	262.3	100
9.	Chennai	250.0	75.8	85
10.	Nagpur	240.0	206.5	75
11.	Pune	202.3	169.8	78
12.	Jaipur	168.0	155.5	80
	Total	8075.9	189.4	93

Source: Report of the Central Pollution Control Board, 1990.

But it has been found that certain pockets in a city like Bangalore for example does face critical water problems, as is often reported from various quarters especially the media – in this case, the concern is regarding the validity of the data provided as also the question regarding the proportion of the population that gets ignored during any kind of data collection.

The fact that a large proportion of the urban population exists in inhuman living conditions does not really emerge from the statistics for most cities, Mumbai for example has 52% of the population living in poverty conditions, without access to basic amenities – the tracts along the railway lines are dotted with slums and one cannot ignore the sanitary conditions of these areas as it stares back at all who passes by. Yet, the statistics for Mumbai show that 99% of the population is covered with water supply – it only means that there is some gross error in the manner in which the data is being collected and reported or who are being represented in the selected samples. Unless a proper representation is made, the planning mechanism will continue to ignore the critical realities of conditions of environmental stress that are prevalent in the large metro cities of India – infrastructure development must take into consideration the large unidentified population as the premise that poverty is the greatest polluter holds good for Indian metro cities more than anywhere else in the world.

Suggestive Measures

The question of urban sustainability brings with it the need to address the basic issues of environmental stress that affects the urban poor – moreover, there is a need to realize that poverty is not just income related, it is related more intricately with the access to quality of life.

Apart from the structural changes the cities are capable of dealing with the issue of accessibility simply by improving the efficiency in the context of inter-departmental functioning for better infrastructure development and its efficient utilization. In the issue of slums, the definitional aspect must be the first point of concern and the identification of all the areas of poor habitats cannot be achieved without it. Secondly, there is a problem of habitat formations in the unauthorized land tracts, which are out of the bounds of surveys and the Census, simply because they are not notified areas for habitats – and these are essentially the areas of extreme environmental stress from the point of health, hygiene and normal safety limits.

As far as the conditions of water supply and sanitation/sewerage is concerned, a major problem may be solved by simply improving the available infrastructure in terms of efficiency in water use and the maintenance of sewerage and sanitation systems that prevail in the urban areas. The larger issue off course is of easier accessibility, which calls for peoples participation in acquiring the basic amenities and owing the responsibility to improve and sustain the given infrastructure to a level of maximum efficiency.

Improved management of resources, increased public awareness and participation in both acquiring and maintaining the available resources may therefore address the issues of environmental stress caused among the urban poor.

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NATURAL ENVIRONMENTAL CONTROLS THROUGH SEASONS ON THE MORPHOLOGY OF THE DIGHA-SANKARPUR COASTAL TRACT OF MEDINIPUR, WEST BENGAL

Sudip Dey
Department of Geography and Environment Management
Vidyasagar University, Medinipur 721102

Abstract

Digha-Sankarpur coastal tract in Medinipur district of West Bengal is well marked for its dynamic morphological character. The processes of erosion and accretion along the coast have been found to be very active over the last 30 to 35 years. Moreover the changes of form of the beach profile have been found to take place by the changing pattern of wave and wind action through seasons. South-southwest wind tends to aggravate wave erosion along the coast through late pre-monsoon to monsoon seasons. High rate of wave erosion is found during the peak of the monsoon season, while north-northwest wind in the post monsoon season supports accretion near Orissa border. Hence climatological parameters have been suggested as important indicators of the pattern of morphodynamics along this coastal tract.

Introduction: Coastal geomorphology distinctly differs from those of the other geomorphic areas like fluvial, aeolian and glacial. Our present day coastlines have developed only during the Holocene period, within 6000 years before present when the present day sea level attained its position (Pethick, 1984). Geomorphologists are primarily interested on the landform development during this period, but the study of coastal geomorphology remains as a real challenge due to its long term and seasonal dynamic nature.

Coastal morphology is controlled by the conditions of the adjacent sea-beach, sand dunes, marshes, spill-basins and lakes, while the morphodynamics of coastal area is controlled by the actions of wind and wave. Climatological factors like temperature, rainfall, humidity, wind speed, and wind directions are important agents for landform modification.

Location of the Study Area: Digha-Sankarpur coastal tract, over which the study of the author has been concentrated, is a part of Medinipur coastal area having a length of about 20km from Orissa border in the west to the eastern end of Dadanpatrabar sector in the east. The north-south stretch of the coastal tract is about 15km from the sea. Digha has developed as an important urban centre as well as a popular tourist centre and Sankarpur is a recently developed fishing and tourist centre.

Geological history and the existing environmental conditions of the Digha-Sankarpur coastal tract: The geological history of the Digha-Sankarpur coastal area has been assessed previously by Niyogi (1970), Chatteree (1972) Banerjee, Goswami and Chatterjee (1997), and a number of other geo-scientists. All the early works, including those mentioned above, have mentioned that Medinipur coastal area developed only within the last 6000 years. The coastline at that time was 15km inward. Geologically it is known as Ancient Digha-Junput coastal deposits. Another two geological units, *i.e.*, a) the older Digha-Junput coastal deposits and b) the recent Digha-Junput coastal deposits have been reported to have developed around

3000 years before present. Geological development of the study area through time and space has been presented in the table below.

Table 1: Geological development of the study area through time and space

Geological Unit	Position and Extension	Period of Development (as has been assessed)
1. Recent Digha-Junput coastal deposit.	Around 5km from the sea.	Contemporary
2. Older Digha-Junput coastal deposit	Beyond 5km from the sea upto 15km	2920 ± 60 Yrs. B.P.
3. Ancient Digha-Junput coastal deposits	Beyond 15km from the sea	5870 ± 140 Yrs. B.P.

[B.P.= Before present] *Source: G.S.I. Report*

Under geological considerations Digha-Sankarpur coastal area can ideally be divided into three geomorphological units as follows: 1) Active marine coastal plain, 2) Relict coastal plain, 3) Inactive marine coastal plain (G.S.I., 1995).

Seasonal nature of wave action: Digha-Sankarpur coastal tract is a distinct sea-wave dominated coast. The nature of wave, *i.e.*, wave length, wave height, wave period, and steepness vary widely due to wind speed which varies from season to season. The most important parameter among these is wavelength, which can be assessed using the following formulae:

$$L = gT^2/2\pi$$

where, L = Wave length, g = *acceleration due to gravity (9.81m/sec^2)* T = *Wave period,*

The following table shows the relationship between average wind speed and wave condition in major seasons.

Table 2: Average wind speed, average wavelength, and the most energetic wave period along Digha-Sankarpur coast

Seasons	Average wind speed (Km/hour)	Average wave length (metre)	Most energetic wave period (in seconds)*
Summer	18.0	30.47	4.42
Monsoon	16.5	25.58	4.05
Winter	08.0	5.99	1.96

[* Most energetic wave period is calculated by T = 0.246 × wind speed] *Source: G.S.I. Report*

The average wavelength and most energetic wave period have been calculated from the wind speed chart. Significant wave height (H_S) has been recorded as 2.4m near Digha (Kabiraj & Sarkar, 1985).

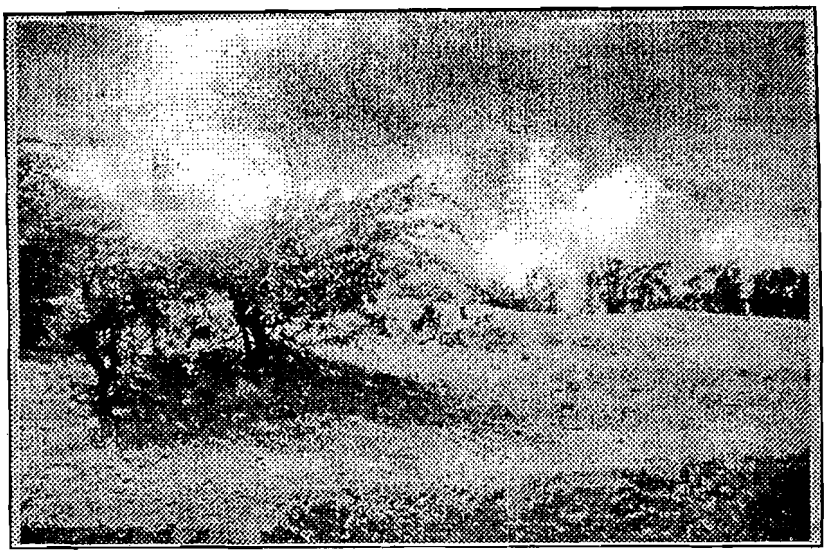

Plate 1: Degraded sand dunes adjacent to Digha sea beach

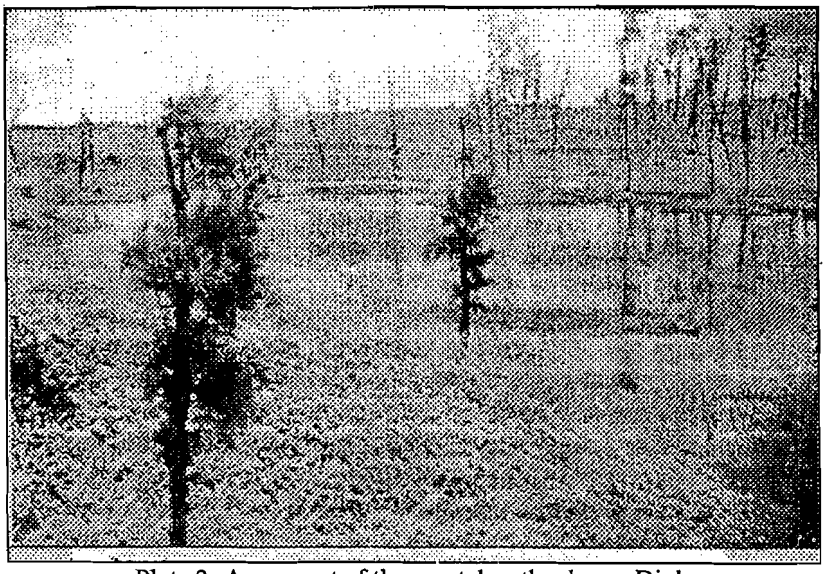

Plate 2: A segment of the coastal wetland near Digha

The present beach condition and seasonal impact of waves upon it: The sea beach of Digha-Sankarpur area is a major attraction not only to the tourists but also to the geologists, Geomorphologists, and the other environmental scientists who have been embarking upon continuous studies on the erosional and accretional impact upon it. It has been observed that the western part of the beach, near Orissa border is dominated by accretion while the eastern part is dominated by strong erosion, both by the wave and wind actions. Occasional cyclonic

storms have also been found to affect the beach morphology. The characteristics of beach condition, assessed from the field studies, are presented in the table below.

Table 3: Characteristics of the beach condition of Digha-Sankarpur coast (1998-1999)

Beach width	Beach length	Beach slope gradient	Thickness of sand	Colour of sand	Compositions
At Old Digha: 252m in the west and 69m in the east; At Digha Inlet: 212m to 240m.	About 8km (from Orissa border to Sankarpur sector)	1:47 to 1:78	Maximum 7.5m to 9m in the east; thickness of sand deposit is less than 1m near *Hotel Sea Hawk*, sea beach is of non existent at the eastern end of Old Digha township	Grey to yellowish grey. In the monsoon seasons colour of the beach looks darker	Sand: Fine to medium grained. Minerals: Hornblende (20%-80%), Limonite, etc. (15%-20%), kyanite, Apatite (5%-10%), Staurolite, Sillimanite, Epidote etc. (5%), Tourmaline, Zircon, Garnet etc. (2%), Biotite, Chorite, Monazites

Source: G.S.I. data

Seasonal modification of beach morphology is very significant. As this area is situated under tropical monsoon type climate, three major seasons are found in this area: 1) Pre-monsoon season or summer season: March to May, 2) Monsoon season or rainy season: June to October, and 3) Post-monsoon season or winter season: November to February.

Beach condition during the pre-monsoon season: High temperature and humidity mark the pre monsoon or summer season. High-speed SSW wind blows, which encourages accretion in the western part and some wind erosion in the eastern part. West to east wind transport is very important. Neo-dunes are formed on the upper beach face by along shore and on /offshore sand transport.

Wave action in this season is comparatively low except the occasional storm waves. Small estuary of Digha River (Mohana) becomes narrower than the rainy season. Land word dune movement creates the problem of drifts over the agricultural lands near by. Gadadharpur mouza (J.L.No.78) is the most affected part due to such wind blown sand drift.

Beach condition during the monsoon season: The monsoon season is marked by high humidity and rainfall contributed by the southwest monsoon wind. During this time wave action takes dominant part causing excessive beach erosion. Due to the local rise of sea level, beach width decreases temporarily about 0.5m in the western part near Orissa boundary and about 5m in the eastern part near the eastern end of Digha Township. In the monsoon season Hoogly and other river carry excessive water causing the rise of coastal seawater (Pethick, 1984). The rise of sea level is calculated by the Brunne's rule (1962) as follows.

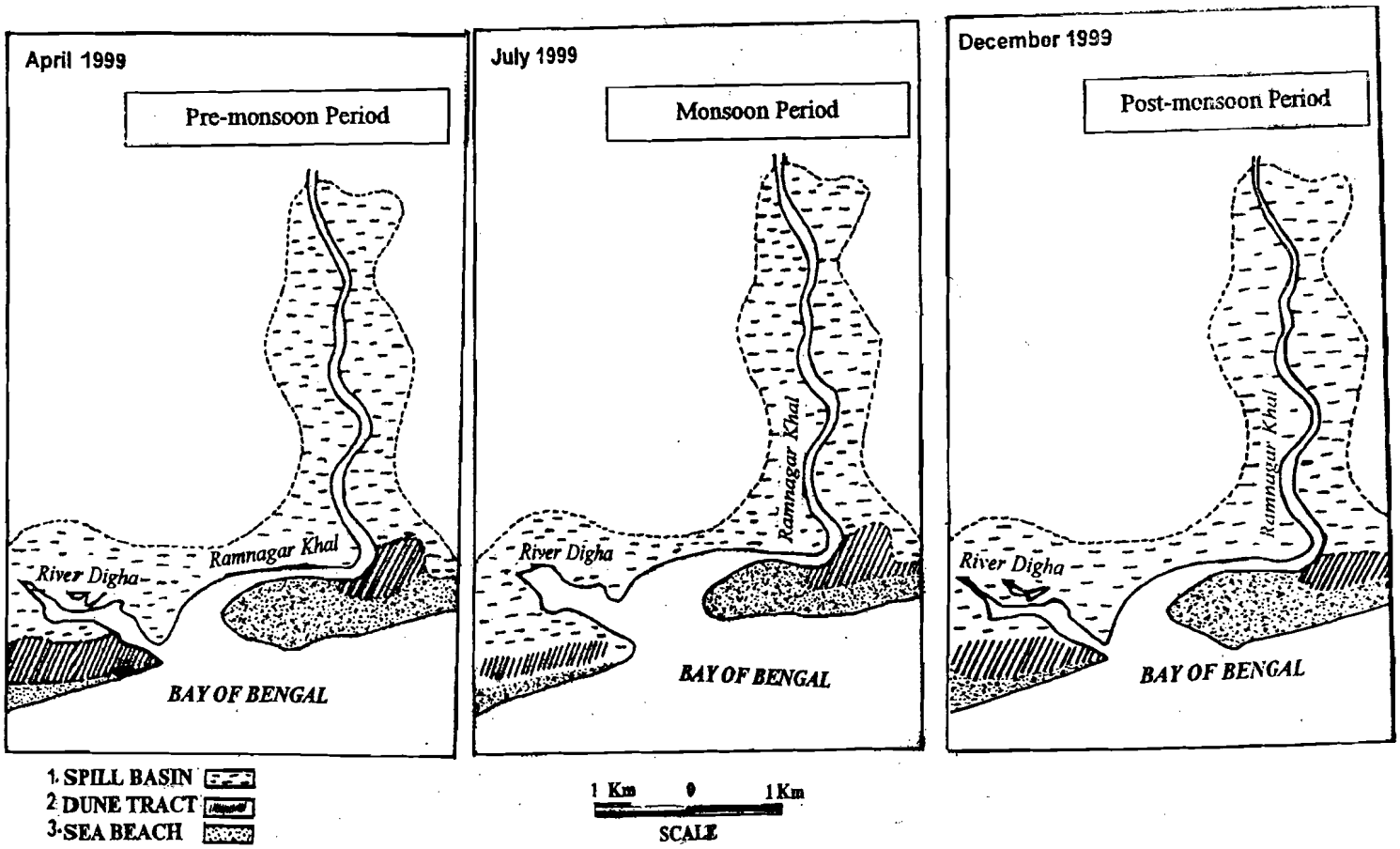

Figure 1: Pattern of seasonal change of geomorphology around Digha Mohana

$$S = ZR / x$$

Where S = Sea level rise
Z= Profile Depth
X = Profile Width
R= Disappeared coastal landmass due to sea level rise

In the monsoon season accretion rate in the western part decreased. Neo-dunes are removed by the wave action. Maximum HWL in this season is 3.05 metre. Digha Mohana becomes wider by the tidal action and becomes trumpet shaped.

Beach condition during the post-monsoon season: In the post-monsoon season, temperature becomes comparatively low. Humidity is also very low in the month of December and January. NNE wind blows gently, which encourages accretion in the western part near Orissa border. The beach width increases 0.5 to 5m due to the fall of local sea level near the coast. In the early post monsoon, the beach slope is steeper due to monsoon erosion on the beach, but it becomes flat in next few months when NNF wind starts to blow.*(See Table : 4)*

Dune-vegetation interaction: Dune movements have been found to depend not only upon the sand and wind speed, pattern and thickness of vegetation cover play a very important role. Laing (1954), Ranwell (1972), Disraeti (1984) and many other scientists worked upon the dynamics of dune-vegetation interaction. Short and Hesp (1982) classified the sand dunes according to their pattern of vegetation cover. Here the author has made a scheme of dune classification according to their pattern vegetation cover and rate of migration on the basis of field study along the Digha-Sankarpur coastal tract. This is presented in the table below.

Table 5: Types of dunes, estimated percentage of vegetation cover and characteristics along Digha-Sankarpur coastal tract

Sl. No.	Types of dunes	Estimated percentage of vegetation cover	Characteristics
1.	Mobile sand dunes	0 to <30% vegetation cover. Mainly covered by the grasses and casuarina plants	Geologically known as 'beach front dune complex'; mostly affected by wind in dry season and by wave in rainy season.
2.	Sami-stable sand dunes	30% to 75% vegetation cover	Geologically known as 'Older dune complex'; found beyond 2km from the sea to 15km inward
3.	Stable sand dunes.	More than 75% vegetation covers	Beyond 10-15km from sea; lower height (2m or less)

Source: Field Investigation Report

General Assessment: Although accretional process is at work in places reason is of certainly the main problem of the greater part of the Digha-Sankarpur coastal tract. Certain amount of sea level rise might have caused landward encroachment of the high water level in recent years. Human intervention, particularly over the last three decades has also been very significant for the change in coastal environment. Construction of fishing harbour, covering a large area at Sankarpur, development of tourism and associated industries (mainly ice and fishing ship/boat-

Table 4: Relationship between climatological and geomorphological conditions along Digha-Sankarpur Coastal Tract

Season	Climatological conditions					Geomorphic Conditions		
	Average Temp. (in °C)	Average maximum Humidity (%)	Average Rainfall (mm)	Average maximum wind speed (km/hour)	Wind Direction	Active processes	Prominent results	Geomorphlogical Features
Pre-Monsoon	29°	80.00	73.33	17.66	SSW-SSE	Low to medium wave action and wind action	High accretion medium wind erosion and low	Neo-dunes formed on the upper beach face; flat beach profile; dune encroach-ment with wind erosion on them
Monsoon	29.2°	81.60	227.00	16.40	Early SSW-SSE Middle SSW/ SSE/WNW Late SSW/ NNE-NNW	High wave action and very low wind action	High wave erosion/ strong wave erosion	Strong wave erosion at the eastern part; beach width decreases; Digha Mohana becomes wider and trumpet shaped due to local rise of sea level. Neo-dunes disappear; more flat beach profile.
Post Monsoon	22.75°	76.50	20.75	7.75	NNE-ENE-NNW	Medium wind action, very low wave action.	High rate of accretion and low wave action	High rate of accretion in the western part; rate of erosion comparatively low; beach width increases marginally than that of monsoon season; its slope gradient steeper in the early part and becomes less in the ensuing months due to sand drift by NNE-NNW wind

Source: Field Investigation Report

building industries) along the coast have aggravated environmental hazards. Under these circumstances study of seasonal changes of the beach form would be very important for sustainable development scheme for the future.

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TEHRI DAM IN THE GARHWAL HIMALAYA: AN ANALYSIS OF THE PROBLEMS OF REHABILITATION

Arindam Dasgupta
Department of Geography
Hijli College
Hijli 721306

Abstract

Construction of Multipurpose River Valley Projects involves displacement and rehabilitation of considerable number of population. Issues of rehabilitation are multidimensional as these are related with economic, social, and cultural aspect of population. The issues regarding the problems of Tehri dam need special attention, as it would help understanding the dimension of problems and nature of implementation of the policy. The people are both rural and urban in nature; so they are facing different type of problems. In the rural rehabilitation center the problems of water, agricultural land, education, health and job opportunities are the dominant issues. On the other hand the urban oustees face problems regarding business as the total population of the old Tehri town have not been shifted to the New Tehri township yet. In spite of this, they hope that after the completion of the dam their economic condition will improve as the people from old Tehri town will shift totally to this new urban rehabilitation center. The transportation and communication linkages are very poor which also hinder the scope for the business. Acute water shortage in the summer months due to frequent power cut has made the life miserable for the urban oustees. So the policy has failed in some respect and it needs proper investigation.

Introduction

The Tehri Dam is presently under construction on the Bhagirathi River, 1.5 kilometres downstream from the old Tehri Township in Tehri-Garhwal district. It has displaced about 45,000 people from their original place of habitation. With the process of evacuation of people from the proposed dam site the Tehri Dam Hydel Development Corporation (THDC) has formulated a rehabilitation policy to settle this large number of population in different parts of Dehradun and Haridwar districts. This investigator, through a number of field investigation and subsequent collection of information through various other sources, has attempted to synthesise the different aspects of problems associated with rehabilitation *e.g.*, physical rehabilitation in terms of geographical space, economic rehabilitation in terms of compensation and other incentives and social rehabilitation in terms of maintaining hierarchy. On the basis of the above analysis, this paper attempts an evaluation of the rehabilitation policy.

Methodology:

Two different types of methodology have been followed for this study. The first one is associated with data base generation and second one comprises a comprehensive analysis of the generated data and thereby assessment of the problems of rehabilitation. Questionnaire survey has been conducted in the field to collect data from primary sources.

(i) Data base generation:

The data for this study has been obtained mainly from primary sources collected through an extensive field survey. Some data has also been collected from secondary sources.

(a) Primary sources: A field survey was conducted upon one hundred and fifty (150) households in the villages of *Athurwala Punarvasan Kshetra* near Deharadun and in *New Tehri township* situated at a distance of 11 km southwest of old Tehri town located at an elevation of 1600m (Fig. 1). Two sets of questionnaires were prepared for collection of primary data. The first set was meant to be circulated among rehabilitated people settled both in rural as well as in urban areas. The second one was used for the households who were yet to be rehabilitated but going to be affected in the near future. The purpose of using questionnaire was to collect information about: a) the amount of compensation and nature of compensation, b) the nature of agricultural land in the rehabilitated area, c) how the money received as compensation has been or would be utilised, d) the past and present occupation of the people, e) the nature of problems regarding basic amenities in the new area, f) the type of social problems faced in the new area of rehabilitation, and g) the facilities regarding basic amenities in the rehabilitated place.

It may be mentioned that ten villages were selected out of fifteen villages at Athurwala for detailed study. For each village, five households were taken and total number of households was fifty. In all thirty-five villages from that yet to be relocated were taken up for the survey. Thirty households were selected from these villages. Thirty-five households from old Tehri Township, which was likely to be submerged after the construction of the dam, were taken. In total 150 households were surveyed.

(b) Secondary sources: Secondary sources of data were a) Tehri-Garhwal District Census Handbook, Village and Town Directory 1981, b) the report on rehabilitation policy prepared THDC to understand the objectives of the policy, basic of determining compensation to rural and urban oustees, and other provisions for compensation, c) Records concerning the payment of compensation to the surveyed house hold, (ownership of land for post- relocation and pre-location).

(ii) Methodology for problem assessment

In order to assess the problems of rehabilitation, following methodology has been adopted:

Its is already stated that, 150 households were covered during the field survey. The questionnaire used was open-ended. It means that respondents were free to give more than one response to particular problems. The data has been analysed in two stages.

Stage-1: Each response is given equal weightage. So the total number of responses might exceed the total number of household because a household may have more than one response.

Let the number of household (i) will vary from 1.....n, where n is the total number of household interviewed. Number of problems (j) will vary from 1.....m, where m is the total number of problems reported by one household or respondent.

For household (i) the problems are presented by xi =(xi1, xi2..... xij..... xim)
= xij for all j =1....m

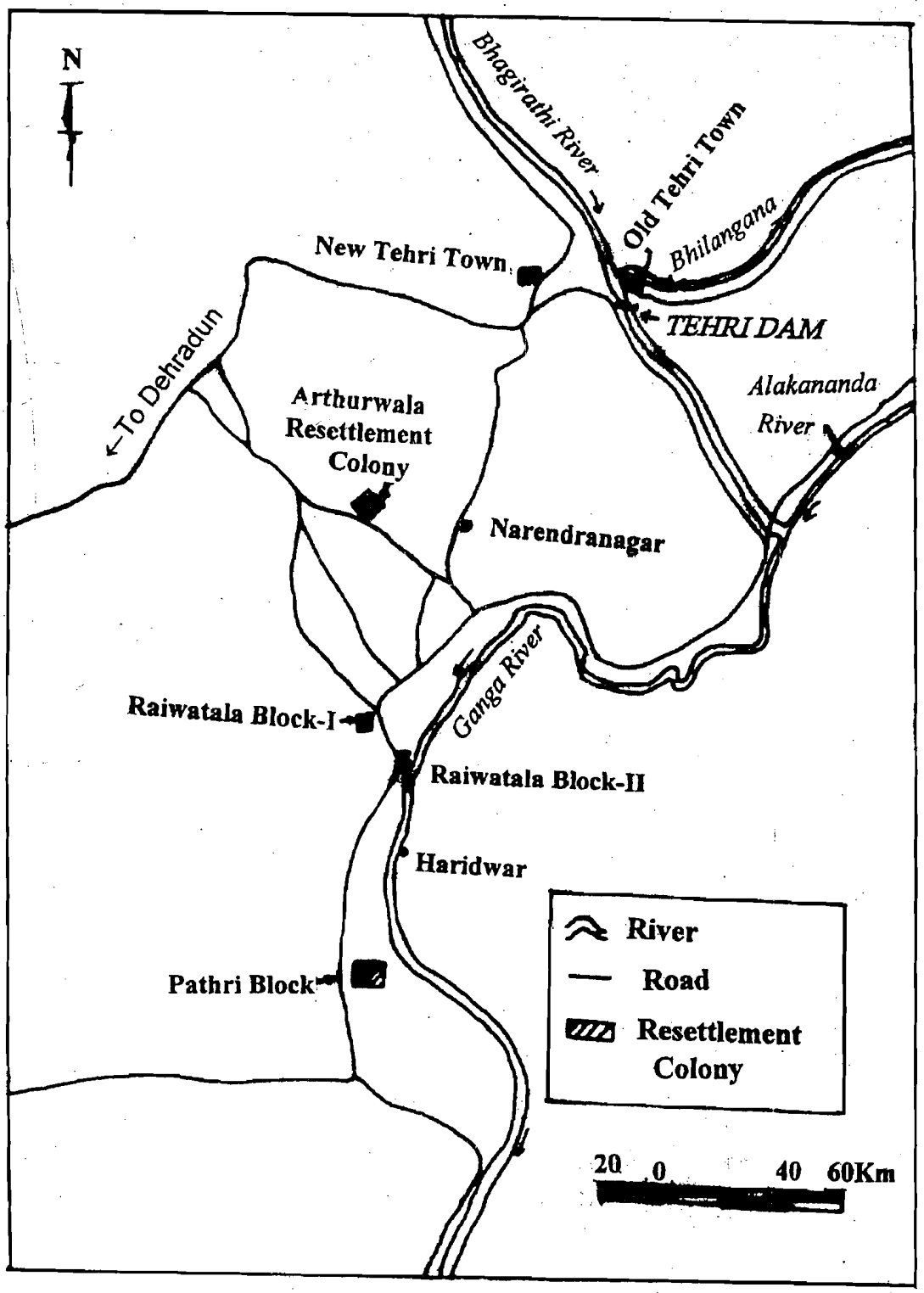

N
Bhagirathi River
Old Tehri Town
Bhilangana
New Tehri Town
TEHRI DAM
To Dehradun
Arthurwala Resettlement Colony
Alakananda River
Narendranagar
Ganga River
Raiwatala Block-I
Raiwatala Block-II
Haridwar
Pathri Block
River
Road
Resettlement Colony
20 0 40 60Km

Fig. : 1

Now, xij=1 if the household reported a particular problem.
xij =0 if the household did not report a particular problem.

Hence for each j, xij has been calculated. Then the respective share (in percentage) of each xij *i.e.* response of a particular household to a particular problem has been calculated. It is represented by Zj=.

$$\frac{\sum_{i=1}^{n} x_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{m} x_{ij}}$$

Finally the percentage have been calculated after multiplying Zj by 100.

This part of the methodology shows the significance of the problems in a absolute sense which can be understood by comparing the percentage share of each response to the sum of total number of responses received under each problems. The methodology has some limitations regarding the order of importance of these responses. This can be explained through a table.

Methodology Table 1: Absolute responses of the households

House holds	Problems				
	A	B	C	D	Sum
P	1	0	0	1	2
Q	1	1	1	0	3
R	1	1	1	1	4
S	0	1	0	0	1
Sum	3	3	2	2	10

The share of the problem A to the sum of all problems is 30 %. Similarly for problem B, C and D the share is 30 %,20 % and 20 % respectively. But for S household 'B' is only the dominant problems reported. But it is not understood from this table.

Stage-II: To make the analysis more representative, it has been assumed that the importance of all the problem expressed by a particular respondent or household are equal and the interviewees are homogenous with respect to all the variables like education, income etc. Here each household is given equal weightage i.e.1.

So Yi=(xi1+xi2+...+xij+...+xjm) where i=1...n and xij is the response ith household to the jth problem. Then the weight of each xij is calculated for household i. This can be expressed through the follwing table:

Methodology Table 2: Weighted responses of the households

House holds	Weighted Problems				
	A	B	C	D	Sum
P	½	0	0	½	1
Q	⅓	⅓	⅓	0	1
R	¼	¼	¼	¼	1
S	0	1	0	0	1
Sum	$^{13}/_{12}$	$^{19}/_{12}$	$^{7}/_{12}$	$^{3}/_{4}$	4

Now, each of these weight are added (column-wise) under each problem for all the households / respondents. After this the total number of households divides the sum of weighted responses under each problem. In this process the percentage of weight of households to the sum of weights of each problem is calculated.

Research Questions

The basic purpose of this study was to understand the different aspects of rehabilitation and assess problems related to displacement of people. A few research questions have been raised for the purpose. These will help to explain the nature of implementation of the policy in the following manner: a) to what extent the families have been affected by the dam construction and how many of them have already been rehabilitated? b) what are the basis for determining compensation to the affected people and how many of them have actually received the compensation? c) how far the agricultural land provided by the THDC as compensation to the rural affected households is suitable for agriculture? What are the main problems faced by the rural and urban rehabilitated persons in the new areas? d) what are the loopholes of this policy as identified from the above analysis?

Objectives of the Rehabilitation Policy

The State Government evolved two separate policies, one governing urban rehabilitation and the other rural rehabilitation. THDC was formed in 1989 and the rehabilitation work was handed over to the corporation in 1990.The basic objectives of the policy were the following:

- Rural oustees to be compensated through allotment of well developed irrigated agricultural land or in lieu there of,
- Rural oustees should be settled in large blocks so that the fabric of their social life remains intact,
- Displaced persons or their representatives to be consulted to the extent possible in selecting the rehabilitation site,
- Essential community services to be provided at each of the rural rehabilitation centre at the cost of the project even if these did not exist in their earlier settlemets,

- Urban oustees will get either plot or constructed house depending on the valuation of their property in the original place,
- In accordance with the norms prescribed by the state govt. husband and wife, even though owning land separately in their name in revenue records are to be treated as one unit for purposes of payment of minimum compensation, allotment of land to land owners,
- The displaced people should not be economically worse off as a consequence of rehabilitation,
- The integration of displaced people in the souci-economic hierarchy prevailing in the new location should be ensured rather than being eked out a living in urban slums,
- Lastly, minors if any, under the category of land owners should also be given same benefit as given to fully or partially affected families.

Structure of the Rehabilitation Scheme

The Rehabilitation programme is now being implemented in two phases. The Phase I involved all those families, which would be affected by the construction of the Coffer Dam. This includes 4909 totally affected families in 28 villages *i.e.*, 15 submerged villages and 13 affected by project work. There are 3686 urban families who would also be affected by the project. The Phase II would include all the remaining 2845 fully affected rural families and 3998 partially affected families (Table: 1)

Table 1: Extent of affected families (Rural and Urban)

Categories			Tehri Dam and HPP	Koteshwar Dam and HPP	Total
Rural	Families fully affected	By submergence	4226	103	4329
		By construction work	683	nil	683
		Total	4909	103	5012
	Families partially affected		3998	280	4278
	Total rural families affected		8907	383	9290
Urban	Families fully affected		3686	103	3789
	Families partially affected		1605	280	1885
	Total urban families affected		5291	383	5674

Source: Hanumantha Rao Committee Rept, Submitted to the Ministry of Power, Govt. of India, New Delhi, October 1997.

Centers have been developed in Deharadun and Hardwar district for rehabilitating the oustees from rural areas. Forestland could no longer be afforded for the creation of the traditional environment for rehabilitation purposes due to forest conservation act of 1980. The authorities had subsequently identified other lands which include private land, land belonging to irrigation department of U.P., land under sick tea garden etc. on the other hand, house plots, flats and shops have been constructed for rehabilitating urban oustees in 3 districts so far. These districts are Tehri-Garhwal, Dehradun and Rishikesh.

Scenario of rehabilitation and compensation for the affected families

The pattern of rehabilitation and the extent of compensation to the affected families were surveyed and the following picture has emerged. A total of 2064 families belonging to 28 affected villages in the first phase and 446 families from 7 villages in the second phase have

been rehabilitated up to March 1998. A total number of 2510 rural families out of 4909, only 51 per cent have been settled so far. Again out of these, each of the 1496 families was given 2 acres of land and the rest received cash compensation. Out of 3686 affected urban families, 2700 families have been given either plots of land or flats in New Tehri township of Nehrupuram, and Pragatipuram. This shows that about 73 per cent of affected urban families have benefited so far from the rehabilitation provision.

Tehri Hydel Development Corporation has defined two terms 'affected' and 'family' in respect of paying compensation to the displaced persons. An 'affected' in rural area means any person who on the date of publication of the notification under section for the Land Acquisition Act. 1894 has owned land or house or engaged in agricultural wage labour in the area likely to be submerged temporarily or permanently. The head of the family will be eligible for getting compensation if he or she owns the land at the time of notification.

There are two categories of affected families:

a) *Fully affected families:* 50% or more of the land belonging to them is submerged. These families are entitled to receive cash compensation for the entire holding, allotment of land and other compensations as per norms, *i.e.*, house structure, grants for seeds, fertilisers etc.

b) *Partially affected families:* in whose case, less than 50% of the holdings have been submerged. These families do not fall under the rehabilitation provisions and are entitled to receive only cash compensation.

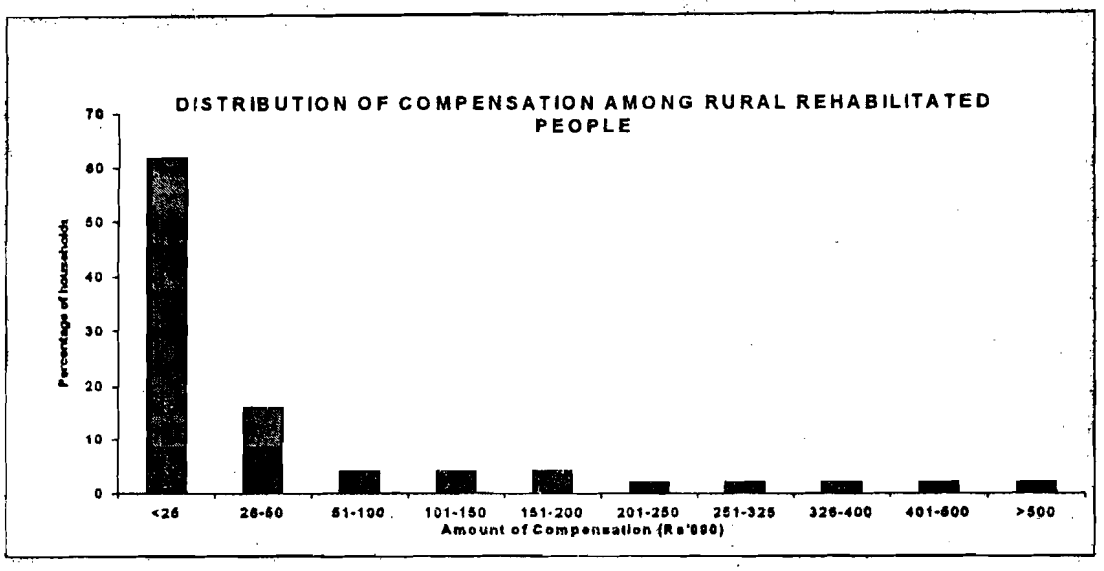
Table 2: Households enlisted for compensation up to November 1997

House holds surveyed			Number of households received compensation		Percentage of households received compensation	
Category	Rural	Urban	Rural	Urban	Rural	Urban
Rehabilitated	50	35	50	35	100	100
Yet to be rehabilitated	30	35	04	28	13	80

The table reveals that there is a clear discrepancy between those already rehabilitated and those yet to be rehabilitated. Only 4 (13%) out of 30 affected rural household have been enlisted for the grant whereas 28 (80%) out of 35 similarly affected urban households were enlisted. This reveals a distinct urban bias in terms of availability of compensation. The distribution of cash compensation among rehabilitated rural households of Athurwala is explained in Table 3.

Table:3 Distribution of compensation among rural people at Athurwala (1979-90)

Compensation (Rs '000)	Households	Percentage to Total House holds
<25	31	62
26-50	8	16
51-100	2	4
101-150	2	4
151-200	2	4
201-250	1	2
251-325	1	2
326-400	1	2
401-500	1	2
>500	1	2

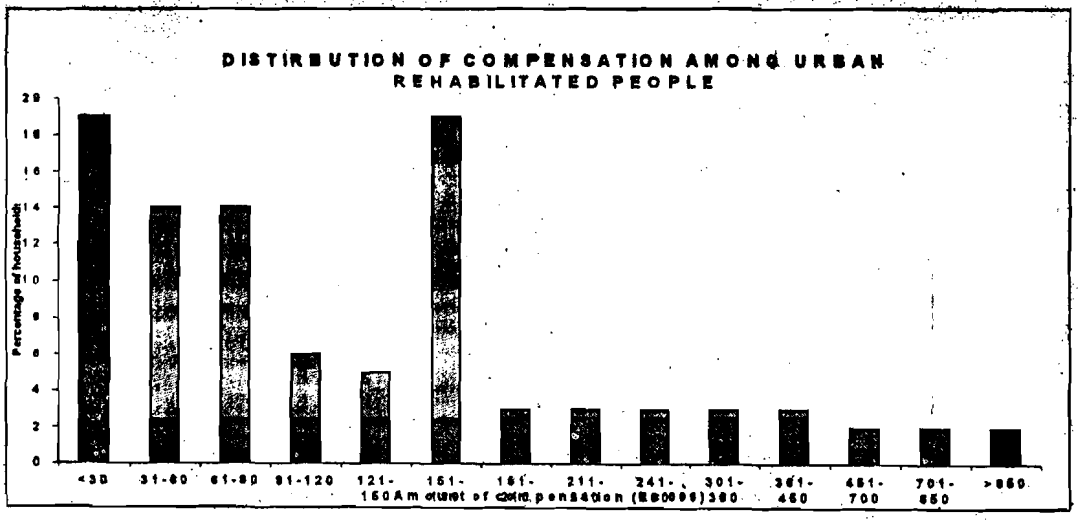


However, one household has received more than 5 lakh rupees. It is clear that majority of the affected rural households had a low- economic status at their original village.

Similarly, the distribution of cash compensation to the affected urban households (Table 4) shows that 58% of 63 submerged households have received up to 1.5 lakh rupees and 26 households (42 %) received above 1.5 lakh rupees. But there are three households, which received more than 5 lakhs of rupees. The distribution shows a bi-modal pattern. The households receiving compensation between Rs 1,50,000 and Rs. 1,80,000 belong to the business community and they are not the original residents of the place. They came here from neighboring hilly regions and developed their assets through various business enterprises. This also suggests a variation in economic status among the urban households.

Table: 4 Distribution of compensation among urban oustees (1979-90)

Amount of Compensation (in Rs. '000)	Number of Households	Percentage of Households
<31	12	19
31-60	9	14
61-90	9	14
91-120	4	6
121-150	3	5
151-180	12	19
181-210	2	3
211-240	2	3
241-300	2	3
301-360	2	3
361-450	2	3
451-700	1	2
701-850	1	2
>850	1	2



Problems faced by the oustees at the Rehabilitation Sites

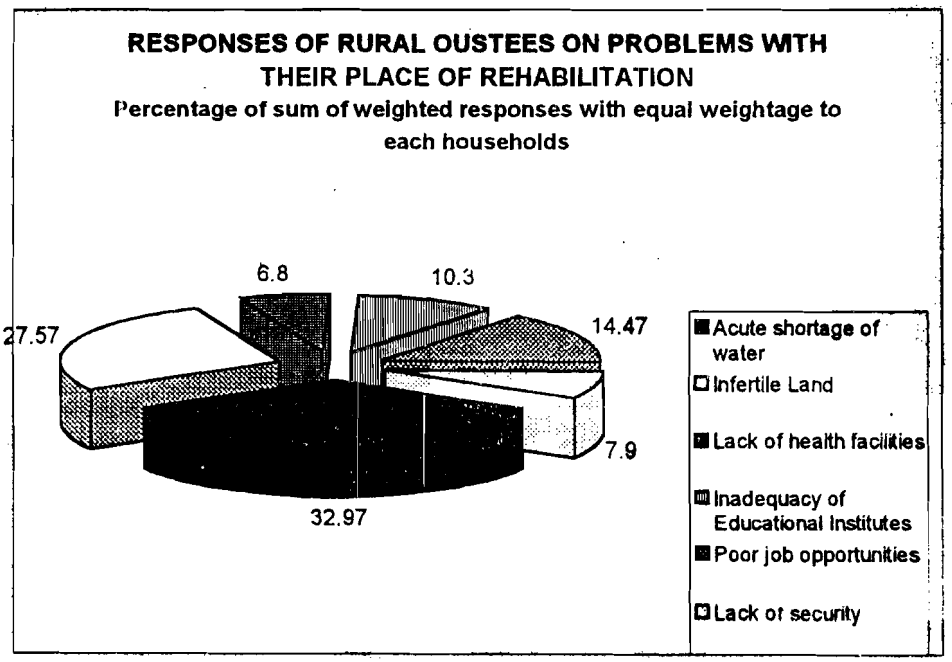
A number of problems associated with the site for rehabilitation has been reported by the people of Athurwala Resettlement Colony. The Forest Department of Uttar Pradesh in 1978 transferred the land to the Tehri Hydel Development Corporation, which was then divided into six blocks to rehabilitate the oustees of fourteen villages.

Responses of rural oustees on problems:

The six major problems as stated by the residents in the rural areas are the following: a) acute shortage of water for drinking and irrigation purposes, b) infertile and unproductive agricultural land, c) lack of health care facilities, d) inadequate number of educational institutions, e) poor job opportunities and f) lack of security.

Table 5: Pattern of responses of rural oustees on problems with their place of rehabilitation

Problems	Acute shortage of water	Infertile land	Lack of health facilities	Inadequacy of Educational Institutes	Poor job oppor-tunities	Lack of security	Total
Sum of weighted responses with equal weightage to each household	16.48	13.78	3.40	5.15	7.23	3.95	50.00
Percentage (Row-1/50)	32.96	27.57	6.80	10.30	14.47	7.90	100
Sum of responses with equal weightage to each response	41	37	13	18	25	13	147
Percentage (Row3/147)	27.89	26.18	8.84	12.24	18.01	8.84	100



The above table and the subsequent diagram shows that about 33% of the households feel that scarcity of water for drinking and irrigation purposes is the predominant problem. Infertile and unproductive agricultural land and job opportunities are the second and third important problems respectively. Other problems are lack of healthcare facilities, inadequacy of educational institutes, poor job opportunities and lack of security. These problems have been discusses as follows:

*a) **Shortage of water***: There are only two tube-wells installed for 680 families in the colony. Due to frequent power cuts, tube-wells often become non-functional. Virtually there is no arrangement for perennial water supply for the residents. The rehabilitated people are often forced to procure inferior quality water from Majori canal or travel long distances (over two kilometres) to collect water. The authority has so far failed to arrange for any permanent water supply facility for the areas promised.

*b) **Land Quality:*** The agricultural land allotted to project oustees was earlier a forestland. This land was found to be infertile and unproductive (the soil being covered with stones and pebbles) as compared to the agricultural plots they possessed earlier. The oustees found it difficult to remove stones from their own plot even after working for eight to ten years. Many households have already spent between Rs. 2000 and Rs. 4000 on land development, thus having spent much more than they received from the authorities. So it is difficult for the households to maintain their family with this agricultural land. For this reason many of the families have left for the cities by selling their property. Another interesting thing is that the oustees have not received their property right till date although the Government has legally acquired it. The revenue record shows that the land is still under the Forest Department. As a result the settlers do not have the access to Block Schemes for developing their land.

*c) **Job opportunities:*** Tehri Hydel Development Corporation promised to provide job to at least one person from each family in the project work. In reality a few of the resettled persons have so far been absorbed. The authorities have under taken neither any rural self-employment scheme nor any training to make them self-reliant.

*d) **Eduactional facilities:*** Only one primary school at the colony has so far been established. Although the school building was constructed before the oustees had settled, it started functioning not before 1991. Till then, the children of the residents of Athurwala and Jolly Grant colonies had to go to school at Bhaniyawala town at a distance of two kilometres, and for higher education (senior secondary school) the nearest place was Doiwala, at a distance of about eight kilometres. Alos the mode of transport to cover these distances was very much poor.

*e) **Medical assistance:*** A primary health centre with inadequate medical facilities is the only resort for health care in this colony and in serious and emergency cases the residents have to rely upon the health centres at Doiwala or Bhaniyawala, quite far away from their localityBesides these, the charges per patient are quite high. There is a private hospital in Jolly Grant but it is very expensive for the common people.

Responses of urban oustees on problems:

The nature of the problems associated with the rehabilitation of the urban oustees is in many respects different from that of rural oustees. The survey was conducted in New Tehri Township where the urban population of old Tehri Township has been settled. The respondents raise mainly five issues. These are: a) limited scope of business, b) problem of proper transport, c) Problems of electricity, d) poor civic amenities, e) acute shortage of water during summer months.

The pattern and gravity of the problems have been presented in statistically in Table 6 and diagrammatically in the ensuing figure. The information given thereby shows that limited scope of business affects maximum number (about 31%) of the residents, the second most acute problem being the transport problem (17.14%) and in respect of gravity are severe power cuts (16.67%) and Poor civic amenities (16.19%).

Table 6: Responses of urban oustees on problems with their place of rehabilitation

Problems	Limited business scope	Extreme weather condition	Acute shortage of water	Transport problem	Poor civic amenities	Frequent power cuts	Total
Sum of weighted responses with equal weightage to each household	10.83	2.42	4.25	6.00	5.67	3.95	35
Percentage (Row-1/35)	30.95	6.90	12.14	17.14	16.19	16.67	
Sum of responses with equal weightage to each response	26	7	12	17	15	17	94
Percentage (Row3/94)	27.66	7.45	12.77	18.09	15.96	18.09	

a) Limited scope of business: Tehri was an old and prosperous town in the Garwal Himalaya located in the central place where the tourist inflow remained high round the year facilitating a good number of people with business of a wide range of commodities. Since only 25 per cent of the total urban oustees have sifted in the New Tehri Township, the demand of commodities declined and naturally the market could not have been regained.

b) Underdeveloped transport system: With the construction and development of the rehabilitation sites the project authority has not yet taken any care for the development of proper transport links (roads) to connect the new sites with the surrounding areas. In most cases (*viz.* The New Tehri Township) the roads are still not metalled and the bus and jeep services are not at all adequate to serve the settlers.

c) Inadequate power of electricity: Frequent power cuts is another major problem in the township. The new township is not yet connected with high voltage transmission lines and thus the daily systems associated with the use of electricity, particularly the water-supply and

the domestic lighting systems, gets very much hampered. The problem becomes worse in the winter months when residents tend to use more electricity for room heating.

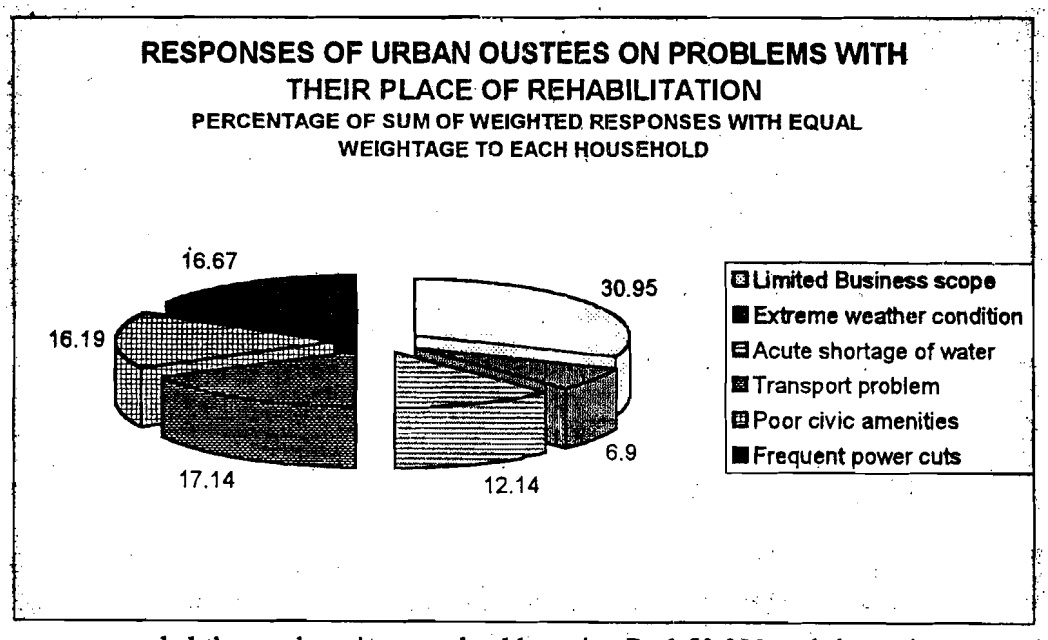
d) Poor civic amenities: According to the observation of the settlers, the new township area has developed without maintaining proper system of sanitation facilities. The garbage dumping pots are placed haphazardly and they are not cleared at regular intervals; garbage often overflow from the bins and chock the sewerage lines causing problems of health and hygiene.

e) Shortage of water supply: In common with the other settlements in the mountain environment the new township area has to rely upon the spring waters for survival. But no proper planning has yet been made to store and regulate the water supply for the township that can sustain the year round. As a result the residents face acute shortage of water in the summer months.

Suggestions on the policy matters with regard to the rehabilitation

On the basis of the above discussion of policy matters on rehabilitation imposed by the government and the associated environmental problems that have generated the following suggestions can be put forward:

a) With regard to the sanction of compensation and rehabilitation the definition of 'family' should be reviewed. In each case the married son or sons his or their families should be considered as full units to receive rehabilitation provisions. Hanumantha Rao Committee



recommended that each major son should receive Rs.1,50,000 and the major unmarried sons and major unmarried daughter should be given Rs.75,000.

b) The policy should be governed by the principle of total rehabilitation. Rehabilitation should not only extend to financial compensation or providing means of livelihood but

should be multidimensional. It should include social, economic, environmental and cultural aspects as well.

c) The aim should be to minimise hardship of displaced people during the process for rehabilitation. Resettlement must proceed for an improved resource base so that the displaced people in their new place can have access not only to shelter but also to food and income generating systems. Communication and social infrastructure should be not be inferior to that of their original habitat and must be provided within a reasonable period of time.

d) The settlement site and the economic base should be large enough to accommodate the natural growth of population and to generate income to provide for a progressive rise in the standard of living.

e) The job opportunities for the resettled people should be generated through indirect employment opportunities and self-employment and income generating schemes.

f) It is expected that there will be an all-round development with the construction of New Tehri Town at higher altitude, which would include formation of reservoir and better road network etc. It is likely to enhance the employment opportunities through setting up of new-polluting industries, development of tourism another commercial activities.

g) The people living along the reservoir rim can be benefited from the *watershed management* scheme by involving local people, which will create employment opportunities. Other schemes like horticulture, fisheries, poultry farming, bee keeping farming can who generate self-employment.

h) The people of resettlement colonies need to be provided help in taking up works in various schemes introduced by the Govt. U.P like poultry farming, horticulture, and by improving agriculture. The introduction of *cold water pisciculture* in the region should also be thought of and a plan should worked out for the training of villagers in pisciculture.

i) Navigational training should be arranged for the young people from the villages around the dam. This would help local people to take up tourist-oriented navigational activities to earn their livelihood after the construction of the dam.

j) The authority should take steps to build at least one school upto class 12^{th} in each of the rehabilitation centres. The water supply should be regularised. Besides, the proposed canal should be constructed as soon as possible. The authority should pay the money, which the resettled people have invested to develop the land, back. The settlers should be given facilities to take loans from the bank for buying seed, fertilisers etc. Some income generating schemes for women, like handicrafts, khadi and other cottage industries, tailoring etc could also be started. NGO's can play vital roles in developmental work by involving people in various schemes. They can introduce some employment scheme with the help of the government to make these people self-reliant.

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ISSUES OF ACCESS TO URBAN BASIC SERVICES: ELECTRICITY IN THE SLUMS OF CALCUTTA

Dipendra Nath Das
Department of Geography, Dumkal College,
Basantapur, Murshidabad 742303
&
Bhaswati Gangopadhyay
Department of Geography, Rabindra Satabarshiki College,
Ghatal, Medinipur 721212

Abstract

The pattern and modes of access to the electricity, as it is considered a basic service required for the slum-dwellers within the area of the Calcutta Municipal Corporation, have been surveyed upon. This paper first attempts to justify the rationale of considering electricity as basic amenities in slums, and then examines and analyses the existing situation of different aspects of electricity at the household level in the slums of Calcutta. A sample size of 522 households of ten slums of different parts of Calcutta was selected and a door-to-door survey was conducted with a pre-prepared questionnaire during the months of February-April, 1994. The numbers of slums selected for survey from four different areas (central, south, east and north) of Calcutta were 154, 118, 91 and 159 respectively. It has been found that more than three fourths of the slum dwellers enjoy the service of electricity by drawing connections using methods both usual and other than usual. About half of the connections to these households are of temporary type and the rest receive sub-connections from the permanent connection holders using non-conventional methods and for this they have to pay much higher amount of money than their actual electric consumption. A set of policy prescriptions is also made along with the ways of resource mobilisation to overcome the short fall of the target of the plan programmes.

Introduction

In most of the metropolitan cities there is a sizable proportion of population living in slums and squatter settlements in poor physical, social and economic conditions (Desai and Pillai, 1972; NSSO,1980; NBO, 1981; Planning Commission, 1983; TCPO, 1985; Maitra, 1991; Mitra, 1993). The very concentration of these people in the areas characterised by poor physical, social and economic amenities (Sen, 1970; Maitra, 1990) are largely due to the process of unplanned and haphazard growth of metropolitan cities which is still on. Over thelast 25-30 years or so, anti-poverty strategies and policy measures for the specified vulnerable groups are on prime focus in urban developmental programmes. Still the conditions of the target groups have not improved much instead of recurrent invasion of developmental programmes (NCU, 1988; Banerjee, 1991; Kundu, 1993). Any reassessment of the implemented programmes has to begin by identifying the unsettled questions in the basic policy approach.

In India, planners in the first phase of Five-Year Plans were more concerned about the economic growth, and welfare of the poor received marginal importance in the plan objectives. The eradication of poverty was expected to be accomplished with the increased

production in agriculture and industrial sectors and with the establishment of infrastructure for further production in those sectors. In the late Sixties of the last century the removal of poverty became the explicit objective in the plans. It was realised that the impact of development seldom reached the poor living in sub-human conditions both in rural and urban India lacking different basic services necessary to meet basic needs. Though it was well accepted earlier that for survival three primary items, *i.e.*, food, clothing and shelter were bare necessities, which were popularly termed as 'Basic Needs' but, with the progress of time it was realised that the meaning of sustenance does not revolve around the only question of survival. It encompasses all those ingredients, which attribute to the human well being. Thus, the age-old concept of 'Basic Needs' has shifted its purview from mere survival to well being in life. Considering this fact in the Fifth Five Year Plan, the first formal attempt was made to eradicate poverty by inducting "Slum Clearance and Slum Development Scheme" under the "Minimum Needs Programme", which encompasses to meet basic needs in a broader perspective. In the successive plans the provision of reasonable level of living and basic necessities of life of the poor received progressively greater weightage in the plan objectives. The programmes, which are made to provide minimum basic services to urban poor, are given in Table 1 in the next page.

The important features of different programmes can be assessed as follows:

1. The main thrust of different programmes is mainly on the items of basic services of education, health care, sanitation, drinking water and shelter.

2. Most of the programmes are made for the people living in slums and squatter settlements in urban areas.

3. All the programmes are formulated at the Central Government level and are executed through different state governments and local bodies of the respective areas.

It is seen that the objective of all the programmes is to ameliorate the living conditions of the poor. The basic services included for rendering to the vulnerable groups show that the planners are concerned about the overall well-being of the poor rather than their mere survival. Since poverty is one of the important causes of poor living condition, some employment and income generation programmes e.g., *Nehru Rozgar Yojana (NRY), Schemes of Urban Micro-Enterprises (SUME), Schemes of Urban Wage Employment (SUWE)* and *Schemes of Urban Employment through Housing and Shelter Upgradation (SHASU)* are also taken along with the basic services programmes.

Table 1: Major programmes on different basic amenities

Programmes	*Items of basic amenities emphasised in the programmes*					
	Education	***Health***	***Water***	***Sanitation***	***Shelter***	***Others***
Urban basic services for the poor (UBSP)	Pre-school learning, non formal education, vocational education, Adult education	Nutritional supplementation, Immunisation, Health checkup	Drinking water supply	Community hygiene and sanitation		Community participation, sports and cultural activities, promotion of civic consciousness
Environmental improvement in urban slums (EIUS)	Community training, pre-school centre, mid-day meal		Low-cost potable drinking water supply	Pay and use community latrine and baths, drains for waste water and storm water		Widening and paving bastee lanes, street lighting, recreational facilities, retail centres
Urban community development (UCD)	Formal and informal education	Low-cost health services specially for women and children	Drinking water supply	Conversion of dry latrine to pour-flash latrine, construction of new latrine	Low-cost housing	Community participation, slum improvement, female employment, self employment, urban social forestry
Integrated scheme of low-cost sanitation for liberation of scavenger (ICS)				Conversion of dry latrine to sanitary latrine, providing pour-flush latrine		
Integrated child development services (ICDS)	Pre-school learning, nutrition and health education	Supplementary nutrition, immunisation, health checkups	Drinking water supply	Sanitation facilities		
Slum improvement programme (SIP I & II)		Medical facilities	Drinking water supply	Sanitation facilities		Employment generation
Slum upgradation programme (SUP I & II)			Drinking water supply	Sanitation facilities	Housing facilities	

Electricity: A Bare Necessity

Suffice it to say that electric connection within the house is essential in slums and squatter settlements for the improvement of health, hygiene, education and economic conditions of the households living therein. The reason behind this is that the dingy and congested slums and squatter settlements are characterised by low rise structure with very small size of rooms, poor housing stock with insufficient ventilation and air circulation and very high occupancy rate (number of persons per room). Getting day light is an extravaganza in these houses. Absence of a separate kitchen for two-third of the households adds more to their misery as they are

forced to carry out cooking in their living room, using candle or kerosene lantern for light. These lamps along with cooking in living room not only generate extra heat but also generate more smoke and insufficient light and compel the inhabitants to survive in unhealthy condition.

In a way, electricity has a role to make the slum people more contributive to development rather than keeping them as liabilities. Electricity has a key role to play in establishing small enterprises at the household level with the encouragement of the self employment generating schemes which not only can tap the idle male and female labour force but can also provide self reliance to them.

Apart from health and hygiene, electricity has other benefits as well. In slums, households have problem of cooking fuel. They mainly use kerosene for cooking and procuring the required kerosene for cooking is a difficult task to them. Hence, electricity can help to reduce the requirement of kerosene and difficulty of procurement. Access to the electricity also encourages the young members in the family to extend their time of reading and writing in the evening hours improving their academic standards.

Objectives of the Study

Since electricity is an important basic service, the study first attempts to examine the existing situation and different aspects of electricity at the household level in the slums of Calcutta. The study also attempts to identify the problems associated with electricity and finally after analysing the situation and reviewing the policies it attempts to put forward some policy suggestions for the betterment and enhancement of the facility of electricity.

For the study a primary survey over 522 households of 10 slums of Calcutta Municipal Corporation (CMC) was conducted with a pre-prepared questionnaire between February to April 1994. Slums were selected on the basis of their geographical distribution. The distribution of the slums is presented in the following table:

Table 2: Distribution of the selected slums and households through Calcutta

Areas	Slums	No. of Households Surveyed
Central Calcutta	1. Parshi Bagan	66
	2. K. C. Sen St.	45
	3. Kala Bagan	43
South Calcutta	4. Ponditia	58
	5. Chetla	60
East Calcutta	6. Tiljala	47
	7. Tangra	44
North Calcutta	8. Paikpara	49
	9. Belgachiya	41
	10. Shyambazar	69
Total	**10 Slums**	**522 Households**

Electricity and types of connection

In the surveyed households of 10 slums of Calcutta, 82.2 per cent (424 households) have access to electricity in their house and the remaining 18.8 per cent have no access to it at all. In slums of north and central Calcutta more than 85 per cent households are having electric connection while in south and east Calcutta this percentage is even lower than 70. This can be ascertained from the following table:

Table 3: Distribution of households with electricity and permanent connection in the slums of Calcutta.

Areas of Calcutta	No. of Households	No. of Households having electric connection	No. of Households having permanent electric connection
Central	154	144 (93.5)	58 (40.3)
South	118	79 (66.9)	34 (43.0)
East	91	60 (65.9)	26 (43.3)
North	159	141 (88.7)	95 (50.2)
Total	522	424 (81.2)	213 (50.2)

Figures in the brackets are the percentages of households.

From the survey it has been observed that the electric connections are of two categories: a) permanent and b) temporary. Permanent connections are those which are given by the statutory electric supply authority of the city and households pay the electric bills according to their consumption of electricity per month. The amount of consumption of the households is obtained from the meter readings. On the other hand the temporary connections are those which are taken either from the permanent connection or from public lamppost. It is interesting to note that almost half of the total electric connection (424) of the households are temporary connections. In central and north Calcutta the percentages of temporary connections are rather higher than those in south and east Calcutta.

During household survey an attempt was made to collect data on sub-connections given from permanent connections. A general tendency of hiding the information was noticed among the households who provided sub-connections from their permanent electric connection. Although utmost effort was made to collect the exact information, there was a scope of having incomplete information because of the fact that the consumers were found to have a tendency to hide the truth. Hence one can argue that the sub-connections could be higher than the results obtained from the survey.

In the survey it has been found that out of 213 permanent connections, 22 (10.3%) connections have further sub-connections to other households. In total 92 sub-connections

have been given from these 22 permanent connections (in average 4 sub-connections per permanent connection).

Monthly expenditure for permanent electric connection

The pattern of expenditure for permanent electric connection is examined by categorising the households into different expenditure groups. Out of 213 households with permanent connections, 50 households (23.5%) have monthly electric bill below Rs. 51/-. In the slums of south and north Calcutta more than 30 per cent households pay less than Rs. 51/- for electricity per month but in east and central Calcutta percentage of households in this range is even below 15. On the other hand, in the expenditure group of above Rs. 150/- there are 26.8% households. East and central Calcutta are having rather higher percentages of households (above 35%) than south and north Calcutta in this expenditure group (Table 4). In the middle expenditure groups of Rs. 51/- to 100/- and Rs. 101/- to 150/- there are 31.9 and 17.8% households where in the former range south Calcutta is having rather high and in the latter range it is low. Other areas are having more or less same proportions of households in both the groups.

Table 4 : Distribution of households by payment of electric bill and average monthly electric bill over the slums of Calcutta

Areas of Calcutta	Households in different ranges of Electric Bill (in Rs.)				Average monthly Electric Bill without Subconnection	Average monthly Electric Bill with Subconnection
	50 and below	51- 100	101 - 150	Above 150		
Central	7 (12.1)	18 (31.0)	11 (19.0)	22 (37.9)	173	487
South	11 (32.4)	14 (41.2)	3 (8.8)	6 (17.6)	102	325
East	2 (7.7)	8 (30.8)	6 (23.1)	10 (38.5)	200	283
North	30 (31.6)	28 (29.5)	18 (18.9)	19 (20.0)	87	334
Total	50 (23.5)	68 (31.9)	38 (17.8)	57 (26.8)	126	336

Figures in the brackets are the percentages of households.

The average monthly expenditure of permanent connections with and without sub-connections has also been calculated. It has been observed that average monthly electric bill of permanent connections without sub-connections is much lower than the permanent connections with sub-connections and this picture is true for all the areas of Calcutta. Except east Calcutta, in all the areas there is a difference of more than Rs. 200/- between permanent connections with sub-connections and those without sub-connections.

Some households have complained that the concerned authority is charging their monthly electric bills arbitrarily which is higher than their actual electric consumption. On several occasions some arbitrary higher bills are charged from the households, without recording the readings of the meter of the electric consumption. With the repeated appeals against this arbitrariness sometimes households get proper response and many a times they are left without any consideration. In some cases, when the meters are out of order, households are charged with arbitrary higher electric bills and authority dose not make any arrangement to replace the faulty meters inspite of repeated requests from the households. In all such cases households are forced to suffer without any justice.

Temporary electricity connection

Temporary connections are mainly the sub-connections of permanent connections and households get these connections in exchange of some payments to the owner of the permanent connections. The recipients of temporary connections have no liberty to use as many points as they desire. By agreement they are supposed to use a certain number of points for certain purposes (e.g., for light, fan, television etc.). The payment for temporary connections depends on the number and purposes of the points.

Distribution of households by number of points:

Among the 211 households with temporary connections there are around 25.6 per cent (54) households who are using only one point and this percentage varies from 11.8 per cent in east to 32.6 per cent in north Calcutta. Percentage of central and south Calcutta is very close to Calcutta's overall percentage (Table 5).

Table 5: Distribution of households in the slums of Calcutta with temporary electricity connections having number of electric points.

Area of Calcutta	No. of house-holds with Temporary Connections	Households by numbers of Electric Points			
		1	2	3	More than 3
Central	86	22 (25.6)	43 (50.0)	15 (17.4)	6 (7.0)
South	45	13 (28.9)	14 (31.1)	9 (20.0)	9 (20.0)
East	34	4 (11.8)	16 (47.1)	7 (20.6)	7 (20.6)
North	46	15 (32.6)	22 (47.8)	7 (15.2)	2 (4.3)
Total	211	54 (25.6)	95 (45.0)	38 (18.0)	24 (11.4)

Figures in the brackets are the percentages of households.

Considering all the areas it has been found that the maximum number of households tend to use two electric points in their residence. Except the southern part in all the other parts of Calcutta nearly half of the temporary connection holders use two points. There are 18 per cent

(38) households and 11.4 per cent (24) households who have temporary connections with 3 and more than 3 points respectively and except the eastern part of Calcutta in all the areas these percentages are lower than the percentage of households with single points. In south and east Calcutta around 20 per cent households, having temporary connections, use 3 and more than 3 points.

Payment for temporary electricity connections

The study on payments for temporary connections reveals that there are 55 (26.1%), 84 (39.8 %) and 40 (19.0 %) households in the range of Rs. 1-50, 51-100 and 101-150 respectively (Table 6). In north Calcutta there is exceptionally high percentage of households (41.3%) in the payment range of Rs. 1-50 and in other areas it is between 20-25%. Except east Calcutta, highest number of households is in the range of Rs. 51-100 and percentage of households in this range varies between 33 and 50. In east Calcutta the highest number of households are in the payment range of Rs. 101-150. There are limited numbers of households in the payment range of above Rs.150.

Table 6: Distribution of temporary electricity connection holders by range of payment in the slums of Calcutta.

Area of Calcutta	Households by different monthly payment ranges for temporary electricity connections (in Rs.)				
	0	1-50	51-100	101-150	Above 150
Central	5 (5.8)	18 (20.9)	43 (50.0)	13 (15.1)	7 (8.1)
South	8 (17.8)	11 (24.4)	15 (33.3)	8 (17.8)	3 (6.7)
East	0 (0.0)	7 (20.6)	7 (20.6)	14 (41.2)	6 (17.6)
North	2 (4.3)	19 (41.3)	19 (41.3)	5 (10.9)	1 (2.2)
Total	15 (7.1)	55 (26.1)	84 (39.8)	40 (19.0)	17 (8.1)

Figures in the brackets are the percentages of households

There are some households who do not pay for their temporary connection. Some of these households received electric connection from their relatives or friends and the rest from sources other than usual, *e.g.*, from street-side transmission lines. The percentage distribution of households over different ranges of payment has a similarity with those of households over number of points. During investigation it was noticed that the payments for a point used for the purposes of light, fan and TV were different and the payment was found to vary from one slum to the other. However, in general, the payment for a single point in different slum varied between Rs. 30 to 50, for two points it varied between Rs. 70 to 100 and for three points it was above Rs. 100.

Although most of the temporary connections are drawn from the permanent connections, a few are drawn from other sources. In K.C.Sen street (central Calcutta) two temporary connections fitted with sub-Metres are drawn from the street-side transmission poles and the

payments are made according to the consumption of electricity. In most of the months the worth of consumption remains below Rs.15 for a single point. In another instance, in Paikpara (north Calcutta) there are three temporary connections drawn from nearby clubhouse having permanent connection and there are two points each in all the three temporary connections. These three households bear the payment of the electric consumption of the club and monthly share (as per the total monthly electricity consumption) per households come even less than Rs.35 which is much lower than the payment charged from other temporary connections.

Consolidation and a general assessment

From the above discussion the following assessment can be made on the pattern of connections and consumption of electricity by the household of the slum dwellers of Calcutta in its different parts.

- More than three fourths of the slum dwellers enjoy the service of electricity.
- About half of the electric connections to the households in the slums are temporary.
- A certain proportion of the electricity users receives sub-connections from the permanent connection holders by means other than normal.
- Households with temporary connections have to pay much higher amount than their actual electric consumption.
- Majority of the temporary connection holders maintains that the owner of the house is the main obstacle in getting their permanent connection.

Over the years programmes on urban basic services are changing in terms of their objectives, target groups, procedure of implementation and funding system to make the programmes more effective. But in all the programmes, lack of resources is mentioned as a major hurdle for increasing facilities related to the well-being of the people and more often lack of money for the programmes is shown as a cause of short fall of the target. In recent years *Shelter/Housing Programmes* and *Urban Basic Services Programmes* are making a provision to extract some portion of the expenditure from the beneficiaries of the programme. The target groups are often condemned for having very low paying capacity for the services and caused a great deal of inconvenience in discharging the services.

In the case of electricity, the slums of Calcutta show a very different picture. Most of the slums in the Calcutta Municipal Corporation are having electricity. But the organisational framework shows a bias towards high-income groups. The statutory authority of electricity does not give any permanent connection without the consent of the legal owner of the house. And the owners of the house do not give the permission to their tenants for permanent connection since they are having easy money from the sub-connections of their permanent connections. On the other hand, tenants purchase sub-connections and pay much higher amount than their actual consumption of electricity.

From the side of competent authority a lot of effort was made to extend the facility of electricity to all the slum dwellers of Calcutta. But the accessibility to the service of the poor slum people is too often taken for granted by the management. There should be a careful design of the supply logistic which could be done after examining the actual field conditions

otherwise a large section of population will not get access to the created facility. The rigid and inflexible norms which are not only non-responsive to the needs of the poor but also give a lot of space to the rich to misuse them and to squeeze the poor, should be reexamined and reoriented.

It is noticed that a sizable proportion of households in slums of Calcutta is indifferent regarding their problem of electricity. They think that in the present situation they can not do any thing to change the situation (giving up attitude). This is a cognitive problem on the part of the people. The problem is of awareness of resource, their availability and their degree of perceived self-confidence in obtaining this resource. In the survey it is observed that in K.C. Sen St. there are two temporary legal connections drawn from the public lamp posts. The expenditure for these connections are much cheaper than the other illegal temporary connections (drawn from the permanent connections of the owner of the house). People of the slums should unitedly pressurise the electricity supply authority to provide temporary connections from the street-side transmission line without disturbing the existing rule (if not possible to change the rule) of issuing of permanent connections. This will help to put a stop on the illegal selling of electricity from permanent connection on the one hand and will give a relief to the poor tenants from high expenditure on electricity on the other hand. Thus a considerable amount of money, which they pay for electricity will be saved and added to increase their real income. Increasing real income with rationalised expenditure will help them a lot to combat other unfavuorable conditions of their lives.

There are other two important problems faced by the people of slums are - political and bureaucratic problems. The permanent connection holders (owner of the houses) are having strong influence on the dominant political groups, which ultimately help them to bring the bureaucratic - administrative personnel into their confidence. Therefore, the politicians and bureaucrats deliberately over look the cause of the vulnerable groups. Here, a strong sustained united community level mobilisation is required to break the politician - bureaucrat nexus.

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Short Communications

ENVIRONMENTAL ASPECTS IN ELECTORAL GEOGRAPHY

Electoral Geography is concerned with the study of processes of political decision-making. This branch of geography studies the spatial and environmental perceptions of such decision-makers. Here, geographical analysis gives an idea of governmental allocations of various spatial activities, which are mainly determined by environment.

The justification lying behind the existence of electoral geography is that many geographical elements are involved in the electoral process. Among those elements the environmental elements play major role. Because the environment is the sum total of conditions which surrounds man. This environment influences voter characteristics such as economic status, income, education, ethnicity, religion and occupation (Dikshit, 1990). In electoral geography the behavioural research examined the relationship between voting behaviour and voter characteristics. The voter castes his votes in favour of the party whose proposals are matching with their own view.

In this study of electoral geography the environment is looked upon as an 'objective environment' and as a 'behavioural environment', or the world of the mind (Jana, 1992). Here the objective environment includes physical environment whereas behavioural environment includes responses of the electorates for individual party image, manifesto, political performance and so on. One can quantify the responses of the electorates with the environmental aspects by some statistical methods like correlation, regression etc. Sometimes direct relation between these two can not be drawn. In such a situation one can take help of some other indirect variables like fertility of soil, percentage of main workers etc. Thus environmental situation and as well as electoral behaviour can be linked and analysed together.

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Dipankar Jana
Department of Geography
Bankura Zilla Saradamani Mahila Mahavidyapith
Bankura 722101

THE HYPOTHESIS OF EASTERLY FLIGHT OF THE GANGA WATER: FACT OR FICTION ?

Prelude

The Ganga and Brahmaputra approach the plains of the Bengal through the Rajmahal-Meghalaya gap. The combined annual discharge of this two mighty rivers is estimated to be 1062.26 x 10^9 m^3 and the sediment load being not less than 2180 x 10^6 tons. The Ganga-Brahmaputra delta (GBD) which covers an area of about 0.15 million sq. km, has been formed by the deposition of the riverine sediment on an archaean basement for the preceding 70 million years and the process continues uninterrupted even this day. The deltaic rivers are fast maturing and oscillate within the swatch of meander sweep. The drainage map of the GBD has appreciably changed during the known historical period and the human intervention into the hydraulic regime of rivers had immense impact to accelerate the change.

The combined waters of the Ganga and Brahmaputra had been flowing westward along the foot of the Himalaya till the late Pleistocene and ultimately discharged into the Arabian Sea through the present Indus estuary. This mighty river was known as the Indobrahm or Siwalik (Pascoe, 1919; Pilgrim, 1919). The area now occupied by the GBD was then submerged under a shallow epicontinental sea. The western tributaries to Bhagirathi–Hugli river namely Mayurakshee, Ajoy, Damodar, Rupnarayan and Haldi independently discharged into the epicontinental Sea. It was during the mid Pleistocene the sea-water finally receded from the Bengal basin (Sengupta, 1966). The area around northwest Punjab experienced a tectonic upheaval during late Pleistocene and consequently the lower Indobrahm or Siwalik River was severed from the remaining part to form an independent river, now known as Indus. The middle Indobrahm was compelled to flow toward opposite direction due to the changing ground slope forming the present Ganga which turned south-east after crossing the Rajmahal hills and ultimately discharged into the Bay of Bengal. The upper or eastern part of the Indobrahm took a southward bend along the western margin of the Meghalaya plateau and opened the way toward the Sea. Since then the delta building operation got an added momentum. The rising temperature and resultant melting of the Himalayan Glacier contributed huge discharge into the rivers. The rising sea level achieved the present status about 6000 years BP. (Bandyopadhyay, 1994). The sea-level continues to rise @ 0.3-0.2mm per year due to increasing contribution of the green house gases into the atmosphere and resultant melting of glaciers (Pirazzoli, 1996).

The Hypothesis of Easterly Flight

The Ganga discharges its water into the sea through many distributaries. It was described as *Satamukhi* in mediaeval Bengali literature. Many scholars opined that the Bhagirathi-Hugli River constituted the oldest outlet of the Ganga water. The decay of the Bhagirathi and the easterly flight of the Ganga water along the Padma is a recent phenomenon. The scholars are of the opinion that the migration took place sometime between the 12th to 16th century A.D. It is further believed that many distributaries Bhairab, Jalangi, Mathabhanga-Churni, Ichhamati, Garai-Madhumati were left moribund due to the easterly migration of the Ganga water

(Rudra, 1987). Three types of the evidences were put forward in favour of the antiquity of the Bhagirathi river:

- The great Indian Epics *Ramayana, Mahabharata* and classical texts like *Matsa* and *Vayu Purana* described the Bhagirathi as the main flow of Ganga (Ray, 1979). But the descriptions in these classical texts are often poetically exaggerated and can hardly be accepted as the historical evidences. It is important to note that the human civilization developed earlier in the western part of the delta compared to its eastern counterpart. This can be attributed to the frequent references of the Bhagirathi in the ancient and mediaeval literatures.

- The archaeology of Tamralipta, which flourished during the 300BC to 700AD as the ancient port, Bengal, has also been referred to as the evidence of the antiquity of the Bhagirathi (Rudra, 1990). The travelers like Megasthenes (300BC), Ptolemy (150AD) Fa hien (300AD), Yuan Chuan (639AD) described the Bhagirathi and Tamralipta which had trade link with the south-east Asia and Mediterranean countries (Rudra, 1981). These descriptions are hardly older than 2300-1300 BP and should be treated as very recent in geological science. The development of a port depends on the economy of the hinderland and might not be always related to the hydrological status of the river.

- The greater southward extension of the delta along the Hugli estuary is a striking geomorphic phenomenon. The scholars believe that the substantial water and sediment load had been discharged into the sea through the Hugli estuary during past geological period. The Meghna estuary, inspite of receiving much greater sediment loads from the Padma and Jamuna has fallen far behind in the delta building operation from its western counterpart. (Majumder, 1942). The southern face of delta has retrograded appreciably during last two hundred years. The possible reasons are absorption of sediment in the reservoirs, wetlands, submarine canyon and erosive wave attack.(Bandyopadhyay and Bandyopadhyay ,1996) The shape of the delta can further be related to its subsurface geology. The Eocene hinge zone which extends from south-east to north-east along the subsurface, divides the Bengal basin into stable shelf zone of the north-west and subsiding littoral tract of the south-east. (Sengupta, 1972). The basement, which receives the sediment load, is tilted eastward. The depth of sediment is much greater along the southeastern part of the delta. Morgan and McIntire (1959) opined that the central part of Bengal Basin subsided under the huge load of overlying sediment and a fault might have developed along the course of the Jamuna or Brahmaputra in Bangladesh. This geological characteristic of the delta can conveniently be related to its disproportionate growth, which need not be related to the antiquity of Bhagirathi.

The hypothesis of the easterly flight of the Ganga water was based on the emotions of the researchers. Sherwill (1858), Oldham (1870), Reaks (1919) failed to distinguish between historical and geological time scale. Subsequently Mukherjee (1938), Majumder (1942), Bagchi (1944), were influenced by their predecessors. Even this author was of no exception (Rudra, 1987). Only Willcocks (1930) and Chaudhury (1964) expressed different views. The former identified all rivers of the central Bengal including the Bhagirathi as irrigation canals excavated by ancient Hindu rulers. Chaudhury made a model study of the deltaic rivers in

laboratory of Cambridge and concluded that the Padma channel has been the main outlet of the Ganga.

Concluding Remarks

The cardinal factor controlling the changing river courses of the GBD seems to be the neo-tectonism, especially the Holocene eastward tilt under the weight of overlying sediment. The eastward migration of the Tista in 1787 and westward migration of Jamuna or Brahmaputra have been attributed to the subsidence along the line connecting Jalpaiguri and Barisal (Hirst, 1916). Morgan and McIntire (1959) identified the subsiding trough along the course of the Jamuna in Bangladesh. The Barind and Madhupur were treated as areas of the compensatory upheaval. Rizvi (1957) treated these two uplands as Pleistocene terraces. Chakraborty (1970) identified Rarh, Barind, Madhupur, Lalmai as the Miocene offshore bar, subsequently dissected by riverine erosion.

Since the underlying basement of the GBD tilts eastward, the Ganga water had to comply the same and flow along the Padma channel. It seems to be an absurd proposition that the Ganga denied this structural control and flowed along the Bhagirathi in the past.

The Bhagirathi is the only spill channel of the Ganga which receives tributaries like Pagla, Mayurakshi, Ajoy, Damodar, Rupanarayan, and Haldi. These western tributaries formed coalescing paradeltas and played very important role in the delta building operation. (Agarwal and Mitra, 1991). The British Engineers repeatedly tried to resuscitate the Bhagirathi off-take since the 19th century but all such attempts proved futile on the tectonic ground. The eastward tilt of the delta has empowered the Padma to incise its bed deeply and consequently the off-take point Bhagirathi seems to be hanging above its feeder. The bankful width of the Padma is about two kilometres while the Bhagirathi near Jangipur is about 300 metres wide. There is no imprint in the floodplain to prove that the principal freshet of the Ganga flowed along the western margin of the GBD. The scholars working on the river system of Bengal Delta till the mid 20th century hardly had any knowledge about the sub-surface geology of the Bengal Basin. The drilling in search of petroleum during the decades of 1950 and 1960 revealed much information about the geology of the Bengal Basin. It is believed that recent southerly tilt of the GBD along the western margin has created a possibility of rejuvenation of the Bhagirathi (Sengupta, 1972). So the age-old ideas about the history of changing the river courses of Bengal need to be reviewed anew.

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Kalyan Rudra
Habra Chaitanya College
Habra, 24 Paraganas (N) 743263

Book Review

Global Strategies of Clean Environment Safe Earth, Disaster Management Sustainable Development and Quality of Life *by N.P. Rao. Published by Atlantic Publishers and Distributors, B - 2 Vishal Enclave, New Delhi 11002. 320 pages in one-eighth double demy; Price: Rs.495 .00 (for hard cover version).*

This book has covered a wide range of contemporary environmental problems and issues. The text consisting of ten chapters along with an Appendix demonstrates a sequential trend of thinking in various facets of environment. The author has only tried to give holistic outlook of the gamut of environmental studies enumerating the challenges, dynamics and impact of environment. This will be a good handbook for postgraduate students interested in environmental studies. This book contain good information on Pollution, Ozone depletion, Global climate, Natural disaster, Recycling, Nuclear wastes, Cleaner technologies, Global issues of strategies, National and International policies and strategies and emerging issues requiring immediate attention. This book, however, lack illustrations by sketches which if given, might have improved its importance as a textbook. Planners and thinkers on environment might have valuable materials from this book.

Ananda Deb Mukhopadhyay
Vidyasagar University
Medinipur 721102