A Report on

Social Audit and Environmental Impact Assessment

Slum Dwellings along Beliaghata Canal

Kolkata

South Asian Forum for Environment
Kolkata

Social Audit
and
Environmental Impact Assessment
in
Slum Dwellings along Beliaghata Canal
Kolkata

A Social Audit Report

August 2012

Prepared By
South Asian Forum for Environment, SAFE

Sponsored By
Consulting Engineering Services (India) Private Limited (CES)

Social Audit and Environmental Impact Assessment in Slum Dwellings along Beliaghata Canal, Kolkata

A Social Audit Report

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Certification

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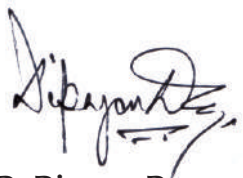
To whom it may concern

This is to certify that the presented report entitled **"Social Audit and Environmental Impact Assessment in Slum Dwellings along *Beliaghata* Canal, Kolkata : A Comprehensive Report"** is an original testimony of work based on primary field data collected by trained volunteers under the supervision of South Asian Forum for Environment, Research and Planning Division. Any of these contents, as depicted here, or its part thereof has neither been published anywhere in any publication format nor has been directly extracted from any other source. The views as expressed by the subjects interviewed or surveyed by SAFE team is absolutely their own and SAFE has no liabilities thereto, if any, for the same.

The survey has been explicitly done for the sponsoring authority as per recommended specification and published for the needful.



Dr Dipayan Dey

Dated 31st August 2012

Acknowledgement

South Asian Forum for Environment [SAFE], a registered civil society organization working towards sustainable environment development and poverty alleviation in the Indian Ecoregion, sincerely acknowledges the support of Consulting Engineering Services (India) Private Limited (CES), Kolkata for sponsoring the study entitled "**Social Audit and Environmental Impact Assessment in Slum Dwellings along *Beliaghata* Canal, Kolkata",** a social audit report conducted by SAFE in August 2012.

Team members of Research & Planning division of South Asian Forum for Environment, who had meticulously carried out the survey work thanks Consulting Engineering Services (India) Private Limited (CES) for extending this support to undertake a pioneering study for use in decision support system towards planning and management of the age old canal as referred here in the milieu.

Research & Planning Division
South Asian Forum for Environment [SAFE]

Forwarding Message from the Project Leader

Dear All

Greetings from SAFE!

I am pleased and privileged to present you an extended report accrued from a comprehensive primary survey entitled "**Social Audit and Environmental Impact Assessment in Slum Dwellings along *Beliaghata* Canal, Kolkata: A Comprehensive Report".**

The report is based on a pioneering sociometric study and environmental impact assessment on the entire stretch of the age old Beliaghata Canal in Kolkata and compiled a comprehensive social audit report for decision support in conservation, management and restoration of the canal that directly drains out the river Hoogly. We are thankful to CES not only for generously supporting this study and help us publishing this report, but also for the guidance and supervision that has made

I feel conceited to share with all that the team of volunteers who had undertaken the survey have worked out implicitly and meticulously to bring out the report within the stipulated timeline. They had been exclusively trained by the Research and Planning division experts of SAFE to take up this challenge with impromptu impetuous and sincerity. I appreciate that the division, as well, had taken backbreaking strain to deploy state of the art methodology improvisation in actualising the survey significantly. The participatory vulnerability analysis, brainstorming through peer review models and modified attitude scaling methods that has been employed in the study has been one of the best outputs of the divisions homework and team synergy.

The field experiences had been extreme in carrying out this survey, which I hope the readers will surely get a feel from the extensive analysis and interpretations of the results drawn out of the work. The nature of assumptions and apprehensions had often been out rightly challenged with startling pieces of evidence revealing truths and astonishing facts and figures. The team had to appropriately prepare for adaptive management and contingency plans to meet such challenges, which they affably enjoyed.

The community participation was wonderful. They not only responded to our framework of questionnaire but also shared their experiences, concerns and information that proved to greatly relevant for validating the work. It is important to note that the spontaneity in participation and cooperation of the target subjects revealed their awareness and sensitization about the conservation and restoration of the canal. The same could be noticed in random sampling sessions and stratified sampling sessions as well.

To all my readers, I sincerely pledge to accept this account as a statement of reality in status of marginal commons, who constitute the bulk of urban poor those are socioeconomically excluded from the mainstream and directly depend on natural resources available at the nearest. Any conservation paradigm has to have a mechanism to negate this negative link between conservation priorities and poverty alleviation. One must not undermine the human dignity and their right to survive in this planet owing to the compromised state of life and livelihood they are in. Let us together plan for a change.

I wish you all a cheerful reading experience.

With Regards

Amrita Chatterjee

Contents

Social Audit

Relevance in the survey

Social Assessment provides a framework for incorporating participation and social analysis into the design and successful implementation of development projects. Social audit is extremely important for economic and sector work. Social Assessments focus on issues of operational relevance, prioritize critical issues from among the many social variables that potentially affect a project's impacts and success, and recommend how to address those issues to ensure that implementation arrangements take into consideration the key social and institutional concerns. In this regard, a Social Assessment may be undertaken at the very beginning of a development intervention to set the framework for subsequent participatory efforts. As such, Social Assessments can contribute to the development of participatory approaches in particular operations, as well as focus attention on important social issues that need to be taken into account in the design and implementation of the operations.

Community and Stakeholder Analysis

This analysis is the starting point of most participatory work or Social Assessments. Social audit addresses the fundamental questions of :

(i) Who are the key stakeholders in the project or study being undertaken or proposed?

(ii) What are the interests of these communities?

(iii) How will they be affected by the project?

(iv) How influential are the different stakeholders?

(v) Which stakeholders are most important for the success of the project?

Social Audit initiated by SAFE

When undertaken within the context of a Social Assessment, a Stakeholder Analysis can contribute to more in-depth analysis of the project's social and institutional context. And, when undertaken prior to other participatory efforts, a social assessment can go as far as developing a participation strategy—including the identification of appropriate forms of involvement for the different peer groups—based on an analysis of their interests in, influence on and importance to the project. It is important that a participatory approach to project work can be applied during all or some of the stages of the intervention, from the time of planning to implementation, monitoring and evaluation.

The first step in Social Assessment is an analysis of the defining operationally relevant social issues that may affect project delivery and outcomes influencing the decision makers/government officials who will now have knowledge in the larger context of sociocultural, political and economic aspects in planning, project designing and implementation.

Social Audit Collects Data

The gathering of information here in the social audit is focused only on issues of operational relevance, and is undertaken with as much local participation as possible. SAFE 's Social Assessment team was trained and were prepared to execute the work with complete interaction with the slum dwellers in the area, and data collection methods were designed in accordance with the appropriateness with the kinds of issues to be addressed.

Scope of a Social Audit

The identification of the stakeholders is generally the first task of an audit. However, a Social Auditor does not study each group of stakeholders separately. Stakeholders have to be considered as a whole, because their concerns are not limited to the defense of their immediate interest. As a result, the Social Auditor will work on the components of a defined Social Policy that includes Ethics, Labor, Environment, Community, Human Rights, etc., and for each subject, the Social Auditor will analyze the expectations of all stakeholders. The scope of the audit generally includes the following policies:

GPS mapping in beliaghata canal survey area

ETHICS

The values that the auditing agency vows to respect makes the ethical component of the audit. Policies include the pledge not to participate in, nor engage in business with people involved in, a series of activities that are deemed offensive. This list of unacceptable activities often includes exploitation of children, unethical treatment of animals, damage to the environment, and dealings with undemocratic regimes.

LABOR

This is the creation of a working environment allowing all employees to develop their potential. Policies include training, career planning, remunerations and advantages, rewards linked to merit, balance between work and family life, as well as mechanisms that ensure non-discrimination and non-harassment.

Collection of water sample from beliaghata canal

ENVIRONMENT

It is about monitoring and reduction of the damage caused to the environment. For instance, policies of reduction of emissions and pollution from waste dumping.

HUMAN RIGHTS

This is to make sure that the agency does not violate human rights nor appears as supporting human rights violators.

COMMUNITY

Social audit has an investment in its local target community. Policies include partnerships with voluntary local organizations, with financial donations,

donations in kind (computers for education, food and clothes for the poor), and employees involvement. The agency may initiate or participate to a major purpose such as the regeneration of a poor neighborhood plagued with unemployment, poverty, low education and racial tensions.

SOCIETY — It is an investment or partnership beyond the community frame under audit and survey. For instance, cause related marketing, that is say developing a partnership with a charity to market a product while giving a small percentage of the sales to the charity.

COMPLIANCE — Identification of all legal obligations and of the means to comply is essential in Social Audit. Policies must deal with changing rules related to its workforce (Labor), its products (Health, Environment, Intellectual property, specific regulations), its administration (Business, Tax), its dealings (supplier and customer liability, Criminal actions) etc.

Outcome and Impacts of the Social Audit

Due to the highly positive reception of the social assessment impacts in the community, SAFE followed it up by a detailed beneficiary assessment survey in consultation with community and stakeholders. The beneficiary assessment aims to support project implementation by providing information on local understandings of the meaning of overall reclamation and beautification of the canal, its relationship to community mobility, social inclusion and equity that is considered the fair share of responsibilities in commencement of the development project.

Social Audit minimizes gap between planning & implementation

It is frustrating to understand that best intended projects concludes in an abortive end or many times slows down due to local disruption, thus it is more practical to give sincere efforts in social assessment in order to minimize gap between project planning and implementation. It has been found that earlier reforms lacked depth in applying the work which at the end became more faddish and static. Considering the fast changing socio-economic dynamics within community, the techniques being used needs to be beyond the orbit of being typically formulaic and superficial. The data provided based on this social assessment will help build techniques that brings innovations, more stakeholder partnerships understands the critical consciousness of the community, it will also provide learning about underlying causes and conflicts that affects the local people's behavior. A holistic approach and planning process will lead to the hiring of an experienced development planner and public relation practitioner within the project to address to grassroots and government levels as well. Gradually, the project implementation phases, surrounding the same community, will pave way to come under control that was initially skeptical of any reform experience.

A Review of Indian Slums...

Review of sociometric survey in slums of metropolis

The definition of "slum" varies from country to country. In India, The Slum Areas Improvement and Clearance Act of 1956 defines 'slum areas' as places where buildings: are in any respect unfit for human habitation; and are by reason of dilapidation, overcrowding, faulty arrangement and design of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light, sanitation facilities or any combination of these factors which are detrimental to safety, health and morals.

The Census of India defines a slum as "a compact area of at least 300 in population or about 60-70 households of poorly built, congested tenements in an unhygienic environment usually with inadequate infrastructure and lacking proper sanitary and drinking water facilities". The United Nations agency UN-HABITAT, defines slum as "a run-down area of a city characterized by substandard housing and squalor and lacking in tenure security".

Slums are an urban phenomenon and they represent an imbalance between migration into cities and economic growth within the city itself. They grow due to poor utilization of the reproductive

child health services provided by the government, lack of awareness regarding birth spacing, very low use of contraceptives, illiteracy, and marriage at a young age. Another reason for growth of slums is migration from rural areas to more developed areas by people looking to earn more through higher-paying manual labor compared to the low-returns life of agriculture.

People living in slums face problems of housing, access to drinking water and sewage facilities. Residents live in overcrowded situations, a majority of them with dirt floors and poor ventilation which can lead to rapid spread of respiratory and skin disease. Also, the lack of safe drinking water facilitates the spread of water borne diseases. The presence of stored water further promotes the breeding of mosquitoes and diseases such as malaria. It is estimated that over one third of slum households have no access to bathroom and toilet facilities, promoting open defecation, which in turn leads to spread of faecal-oral disease and parasitic infestation. According to the 2001 census, literacy in slums was only 65 per cent, though slums in Chennai are at 80 per cent, above the national average. Though education is provided free to slum children, the dropout rates remain high, and many students do not continue studying beyond their 8th standard. Even those children who become literate, lack suitable educational levels to pursue higher studies-the only way to break out of a vicious cycle of poverty.

While slums represent a huge economic failure, the problems that slums suffer from, are beyond economic ones. For example, alcoholism is a disease endemic to slums and it leads to moral and economic degradation. Besides limiting the amount of people's income that can be spent for their family, alcoholism also leads to social diseases of domestic abuse as well as serious health problems. Thus, the very existence of slums raises questions of

civic planning and governance in urban India. When one considers the status and living standards of slums of India, sometimes it becomes difficult to consider them as human settlements. They are looked upon as cattle or any other lower form of life. Slum population in India, according to 2001 census, stood as high as 40,297,341 i.e. about 4 per cent of the total Indian population. About 22 per cent of the slums dwell in the cities.

The slums of Beliaghata canal... an unbelievable habitat

Amongst the states, Maharashtra leads with a slum population of 10,644,605 persons, followed by Andhra Pradesh and Uttar Pradesh. While Goa is at the bottom in the list, the city of Mumbai has about 49 per cent of its population living in slums. Slums cover only six per cent of Mumbai's land and its growth rate is greater than the general urban growth rate. Even globally, the number of slum dwellers is rising due to increasing population. Around one billion people worldwide live in slums and the figure is likely to double by 2030. A common characteristic feature of slums across the world is the low socioeconomic status of its residents, most of whom employ them in the informal trade. This can include street vending, drug dealing, domestic work, and prostitution. In some slums people even recycle trash of different kinds from household garbage to electronics for a living. They either sell the odd usable goods or strip broken goods for parts or raw materials.

A recent profile of Beliaghata canal 2012

Often slums are informal settlements and hence they face the brunt of natural and man-made disasters, such as fires, landslides, as well as earthquakes and tropical storms. In many slums, especially in poor countries, people live in very narrow alleys that do not allow vehicles like ambulances and fire trucks to pass. The lack of services such as routine garbage collection allows rubbish to accumulate in huge quantities. The lack of infrastructure is caused by the informal nature of settlement and no planning for the poor by government officials. It seems that the global

community is falling short of the Millennium Development Goals which targeted significant improvements for slum dwellers. In India too, the number of people living in slums has more than doubled in the past two decades and now exceeds the entire population of The Great Britain.

Many governments, especially in the Third World, have attempted to solve the problems of slums by clearing away old decrepit housing and replacing it with modern housing with much better sanitation. However, when a slum is cleared, often the former residents are not welcome in the renewed housing. Moreover, new projects are often on the semi-rural peripheries of cities far from opportunities for generating livelihoods as well as schools, clinics etc. Hence, at times inner city slum dwellers militantly oppose relocation to formal housing on the outskirts of cities. In some countries, the situation has been addressed by rescuing rural property rights to support traditional sustainable agriculture. However this solution has met with open hostility from capitalists and corporations. It also tends to be relatively unpopular with the slum communities themselves, as it involves moving out of the city back into the countryside, a reverse of the rural-urban migration that originally brought many of them into the city. It can be argued that slum clearances tend to ignore the social problems that cause slums and simply redistribute poverty to less valuable real estate. Moving of communities out of slum areas to newer housing may result in loss of social cohesion. If the original community is moved back into newer housing after it has been built in the same still subsists on incomes below poverty line. 80% of meager earning go towards food and the majority of them lives in slums settlements under inhuman conditions that deny them dignity, shelter, security and right to basic civic amenities or social services, civic location, residents of the new housing may face the same problems of poverty and powerlessness. So, there is a growing movement to demand a global ban of 'slum clearance programmes' and other forms of mass evictions.

Kolkata's slums contain a wealth of diversity that is obscured by the poverty and disorganization surrounding the communities.

This paper delineates the categories of slums according to their historical generative forces, details the ethnic composition of slums, and examines the historical patterns of slum policies. Case studies from other researchers are used to paint a picture of slum diversity. The data from the studies is also foundational in the analysis of how historical influences and ethnicity have shaped current conditions in the slums.

The slum-dwellers of Kolkata live "under physical conditions that are not fit for human habitation,"despite the efforts of the government, a variety of philanthropic organizations and slum-dwellers themselves. In order to accelerate amelioration of the grim slum conditions, slums' physical, social, and economic characteristics must be understood for the factors that shape them, the populations that inhabit them and the constraints imposed by the politics of squatter settlements and refugee settlements. Lessons must be learned from the shortcomings of past policies on slum improvement, slum clearance, and slum-dweller rehabilitation. New policies must consider ethnic diversity, disparate occupational skills, and social and political structures that have proven critical to the survival of slums and their inhabitants.

This comprehensive report of the Beliaghata canal on basis of social audit and Environmental Impact Assessment by South Asian Forum for Environment, to look into various aspects of Beliaghata canal, mainly slum statistics, census, environment impacts, using specific statistical techniques used in order to fill information gaps that exist at the present. Increasing urbanization is emerging as the most pervasive and dominant challenge as well as opportunity facing our country today. Urban population in India has grown from 78.9 million in 1961 to over 300 million as of now. Cities and towns are centers of agglomeration economies, investments, technology, innovation, economic growth and tertiary jobs; they are also the hopes of millions of migrants from the rural hinterland and smaller settlement, thus high density

slums and squatter settlements are bound to escalate. This is the condition across most developing countries and India is no exception. In case of metropolis Kolkata's the slum population largely represents the settlers that have aroused from non aboriginal stock especially from other states of Eastern India and Bangladesh. This segment or the migrants have been using Kolkata for shelter and protection, and most important for the economic opportunity; continues to contribute to the rise in slums.

Concerns

An estimated 25% of urban population do not have access to basic amenities for living or social services in an environment which harbours crime, ill health, disease frequency raising demands on their resources that drags them deeper into vulnerability and poverty.

Slum population constitutes 5.1 percent of total population of the country. The slum dwellers in 1743 cities constitute 18.5 percent of the total urban population of states and union territories. This is a consequence of urbanization in developing countries. Unless this possibility is consciously taken note of and corrective action initiated early, it can lead to serious hazards like increasing inequity and retarding the GDP potential of urban areas.

Significance

In special reference to Beliaghata canal, it is necessary to put our minds together to find meaningful solutions to these problems. If urbanization has to act as a positive force in economic development, we have to overcome our past mistakes and aim at an urban and regional planning system that is inclusive and does not exclude the poor and the informal sector. A comprehensive information data on the slums is essential for formulation of an effective and coordinated policy for improvement or rehabilitation of slum dwellers.

Beliaghata Canal : Brief Background & History

A Socio-political & socio-economic backdrop

Old Beliaghata Canal of British India.

Foreword : Story of Beliaghata Canal's growing pains...

Filth clogs the Beliaghata canal of Kolkata; more delimited by dense slums- looking eternal contemplate the unbearable poverty and pollution. Hardly anyone knows that once in glorious days of past, Bhagirathi would glide with huge flow of water, making the canal wide enough to be used as an important medium of transportation and the big trees made the landscape densely green on both sides.

As the city's pace of urbanization accelerated, witnessing a mammoth change in its geography, demography and economy, the Beliaghata canal is choked, and the entire stretch appears as a blemish in the backdrop of modern Kolkata today. The negative consequences of urbanization has fallen havoc upon the canal, high density slums, pollution, degradation of environment, traffic congestion, and crime are far more dominating issues posing a challenge to the reform process.

While passing through the Beliaghata canal with survey team members, we were bunged by a man sitting on floor, his face frozen in grim preoccupation, his wife surrounded by his five children boiling rice outside their crudely built shack of hut. After we made our introductions; he began telling about his migration from Bihar about 20 years ago in search of job in Kolkata, and worked as a daily labour. Today he is jobless and aspires to return to his native village, but his family is reluctant to leave the city, as children born here prefer Kolkata more than Village in Bihar. The Millennium Declaration specifically recognizes the need to improve the lives of slum dwellers. The existence and proliferation of slums is especially acute in cities of the developing countries. The dynamics of urbanization and migration in a large and rapidly growing city is far too complex. In the hope of more opportunities, poor man with his family shifts to big cities. The Social Assessment exercise carried out by SAFE with support from CES has promoted a more informed discussion of Beliaghata canal reclamation between slum dwellers and stakeholders. Based on the findings of the assessment, the project design may now include specific actions to develop a communication program. Earlier, evacuation and beautification work had led to misconceptions about the government's plan to reclaim the canal and prevented them from supporting the work.

The objective of the social assessment aimed to evolve more appropriate data, capture more efficient statistical techniques to obtain more accurate estimates of the area surrounding the canal. Incremental inputs in our knowledge and profound understanding of the situation defines more practical policies and feasible action. Factory workers, ragpickers, labourers dwelling in the slums endure life under most unhygienic and unsuitable conditions, children in slums play in heaps of garbage on the banks of canal, families completely unaware of the caustic effluent they

are exposed to, may bring serious health injuries. In view large number of children involved in waste picking in these slums, the need to mainstream them in taking up initiatives like nutrition, education, clothing, and equivalently creating awareness among parents is the intrinsic part of reclamation and reform process. With significantly large number of marginalized people deriving a livelihood from area surrounding the canal, at this point it is necessary to develop evolving awareness to bring a shift away from old habits and attitudes in the community and local authorities. In forthcoming days, collective partnership including all stakeholders and a strategic holistic approach can successfully work as a catalyst in changing the face of the Beliaghata canal.

A Review : From the pages of history...

Today, what we see as Beliaghata Canal was earlier known as the, 'Channel', or 'Creek' in ancient documents. In earlier times Bhagirathi would flow from the stream, 'Adi Ganga', and during this period the channel came out of Ganges and were very wide, a huge flow of water and used as a mode of transporation. According to the research and data available during the 16th century, a neo-tectonic movement occurred in the Gangetic delta and the main stream of Ganges shifted to Padma also the main stream of Bhagirathi took a new route to Bay of Bengal leaving the 'Adi Ganga', since then the depth and width of these channels have been gradually decreasing due to shortage of water and sedimentation of soil, it took the shape of a narrow drainage canal.

Old Beliaghata Canal of British India.

In the 12th century, during the time of King Ballal Sen, both sides of the channel were full forests and with few small villages. This channel was also known to facilitate trade with outer India. This creek has also witnessed the fight between Mughals and Pathans, during 13th century, however no concrete record could be found during this period. In the 17th century, there were three villages Sutanati, Govindapur, and Kolikata and this canal, then known as a creek of river GANGES traversed through a village Govindapur, and was used as inter Bengal transportation channel.

During 24th August 1690 Job Charnock stepped in Kolkata, and started the trade of East India Company, the British records of early 18th century says that a small creek passed by the north Dharmatala flowing from Chandpal ghat to Beliaghata, salt water lake or which is now known as Dhapa, here the point that it met the saltwater was known as Beliaghat now known as Beliaghata Canal. In 1737, a devastating storm affected the very geographical features of the city, it is known that in 1742, Maratha attacked Kolkata and to save Kolkata the Britishers proposed to build a circular

Confluence of Beliaghata canal with river Hooghly

canal along Kolkata. It was a circular canal started from Chitpur creek and ended in Beliaghata canal. Due to heavy soil deposition the depth of Beliaghata canal decreased very much, in 1810, this canal was fully reformed by the British for the navigation purpose. After Independence, a rapid increase in the population took place. Many slums settled in the banks of canal, and navigation process almost stopped, it was then used as drainage canal. With the time due to tremendous urban pressure and geographical changes the canal was greatly reduced and not much of reformations could be done. In 1960, the irrigation department planned to fill up the canal, but it was never executed.

Present Work

Objective, Design, Methodology, Tools & Team

Project Rationale & Purpose of Social Audit

The main purpose of the sociometric study analysis and intervention will be to develop a decision support and planning material in renovating and reclaiming the age old *Bhagirathi* creek flowing across the metropolis and currently known as the Beleghata Canal. The assessment is supposedly to help rehabilitation and social inclusion modalities for slum dwellers along the canal. The purpose of conducting Social Audit is not to find fault with the individual functionaries but to assess the performance in terms of social, environmental and economic community goals of the programme to be implemented. It is a way of measuring the extent to which any development programs can be implemented effectively. It provides an assessment of the impact of development and welfare objectives through systematic and regular planning, based on the views of its stakeholders. Government departments and corporate sectors as well are facing an ever-growing demand to be more accountable and socially responsible and the people are becoming more assertive about their rights to be informed and to participate in governments' decision-making

processes. Thus circumstanced, the executive and the legislature are looking for new ways to evaluate community stakeholders and in undertaking "Social Audits" to monitor and verify the social performance claims of the community organizations and public institutions. Social Audit is a tool with which government departments can plan, manage and measure non-financial activities and monitor both internal and external consequences of the department or organization's social and commercial operations. It is an instrument of social accountability for an organization. In other words, Social Audit may be defined as an in-depth scrutiny and analysis of the working of any public utility vis-à-vis its social relevance. Because of these reasons, Social Audit gained significance especially after the 73rd Amendment of the Constitution relating to *Panchayat Raj* Institutions.

Objective of the survey

The prime objective of the study is to get an overall description of the socioeconomic status and state of surrounding physical environment along the Beliaghata canal that can be used as a decision support document in pro community conservation planning and sustainable development of the habitat and its people. However, to accrue this holistic result, the main objective is segregated into short term objectives, wherein the outcomes are more tangible and verifiable. A panorama of such integral objectives are given as hereunder

1. Social Audit for successful commencement of reclamation project of the Beliaghata canal towards sustainable development of the habitat, beautification, and abatement of bio-physical pollution.
2. Validate the options of rehabilitating the embankment dwellers towards improved standards of living of the urban poor, displaced and other vulnerable groups.
3. Addressing community issues recording grievances and building the entire public relation mechanism towards increasing resilience to change and preparedness to acceptance of successful slum rehabilitation program which involves voluntary in-situ rehabilitation at pre-project levels.
4. Assessment for improvement of water supply, sewerage, drainage, internal and approach roads, street lighting and social infrastructure facilities in the area.
5. Communicating to overcome community apprehensions about the implications of the

project and recording the characteristics of households for evaluating their entitlement

6. Capacity building opportunities and feasibility studies on unemployed youth, both men and women in slums
7. Creating awareness towards health & hygiene and better living and as well creating scope for information sharing, mechanism for collaboration and empowerment.
8. Increase community and stakeholders participation in development initiatives, decisions and sustained use of resources and design measures that would mitigate any detrimental effect.
9. Identify cost effective steps for improvising the living standards of poor slum dwellers, and
10. Ensure that the project objectives are appropriate and acceptable to the diverse groups of dwelling on the banks of canal.

Design of the work

The whole survey work is composed of three integral segments those are complimentary to each other and happen in correlation so that the overview is drawn out almost instantaneously. These components are

- **Standardization of methodologies and tools for survey :** This constitutes the measuring scales and evaluating machinery on which the survey results will be collected and analyzed. The tools need to be methodical, transparent, quantifiable, directly implacable and not sensitive to commons feeling. This was prepared after researching on various models and modifying the model appropriately by test-run validation in the field.

- **The actual survey :** This is the main activity to reach the subjects and interact with them using the tools created usually by interviewing or interactions. This was carried out by a band of twelve young students, who were adequately trained in this for enriched delivery and competent performance. The trained team was supervised by the trainers for contingency planning and overcoming externalities. The whole stretch was divided into six clusters that are distinct in contour, composition and characteristics. Linear and parallel survey was carried out for the purpose.

- **Outcomes and Impact assessments :** The raw and primary data needs to be processed before analysis of results and has to undergo various statistical interventions like Analysis of Variance at distinct (ANOVA 1% - 5%) levels, standard deviations, absolute and relative patterns in data trends etc. The interpretations are supported with graphical and schematic diagrams and explanations for making a clear and understandable content for end users.

Salient Features of the Survey

The foremost principle of Social Audit is to achieve continuously improved performances in relation to the chosen social objectives. Eight specific key principles shall be integral to make the survey at-par in standard with global survey and assessment norms. They are :

- **Multi-Perspective/Polyvocal :** This aims to reflect the views (voices) of majority of those people (stakeholders) involved with or affected by the programme.
- **Comprehensive :** It aims to (eventually) report on all aspects of the target beneficiaries (Slum dwellers) work and performance.
- **Participatory :** It encourages participation of stakeholders and sharing of their values.
- **Multidirectional :** It considers the stakeholder's share in opinion and gives feedback on multiple aspects so as to facilitate multi-criteria strategic assessment.
- **Regular :** The assessment aims to produce social accounts on a regular basis so that the concept and the practice become embedded in the culture of the organization covering all the activities .
- **Comparative :** The assessment provides a means, whereby, the organization can compare its own performance each year and against appropriate external norms & benchmarks to provide comparisons with organizations doing similar work and reporting in similar frame.
- **Verification :** Ensures that the social assessment tools are implied and validated by a suitably experienced person or agency with no vested interest in the organization.
- **Disclosure :** Ensures that relevant chapters or part thereof of the audited reports are

disclosed to stakeholders with the consent of the organization and the wider community in the interests of accountability and transparency. The standard methodology to be implied in the survey shall be customized as per the needs of the programme. The tools will be validated before implementing in the field and final tools will be subject to test-run in the field. Following methods will be implemented for the survey as a standard norm.

(a) **Data sample**s will be collected following standard norms as

- ***Sample size* :** Representative sample size will be determined based on the population size obtained from secondary sources.
- ***Sampling method* :** Both random and stratified samples will be collected. Stratification will be based on age and gender
- ***Sampling techniques* :** General interviews and questionnaire survey will be used. Physical observation and secondary data will be used for validating the trends.

(b) **Attitude Scaling :** A seven point attitude scaling will be done on modified Liker's scale (Liker, Jefferson & Morris 2007) for opinion casting.

(c) **Participatory Vulnerability Assessment (PVA) :** PVA will be done through peer grouping, brainstorming and collective communication and risk assessment process following Davis et al 2003; (modified 2009).

(d) **Area mapping and zonation** will be done with GPS (Germin 72 Channel FX220) for data plotting and comprehensive opinion zones. The map will be provided with the report for reference.

(e) **Statistical data interpretation** will be done following standard deviation and analysis of variances (ANOVA) at +5% levels at software interface. <MS Excel>, <Survey Pro – Version 5.3> and <SPSS 32> will be used as and when required, for the same.

Since the programme is a very short tenure, non seasonal application, only term-end deliverables will be presented. The presentation will be printed and published in both hard and soft versions and will collectively analyze all primary data collections. Report would include tabulated, schematic and graphical representation of the analyzed data stock. Necessary sociogram and photo documentation will be supplemented with the report. The deliverables will contain

- Demographic prototype of the slum dwellers with indicative socioeconomic indicators.
- Strategic assessment reports on environment, hygiene and health and impacts of urbanization
- PVA and Polygraphic studies on social risk assessment, abuses and intrusive events for analyzing social vulnerability status
- Opinion plots on relocation, rehabilitation, re-establishment issues through 7-point attitude scaling
- Strategic assessment reports on basic amenities and facilities availability in the area with zonation maps that includes water, medical assistance, primary education, electricity, facilities for urban poor.
- Comprehension on innovative and suggestive strategic plan for rehabilitation, participatory renovation and settlement objectives for decision support to future programme

The Survey Team

The team selection for the survey was methodically done to include ten young and experienced candidates, who has the compassion for the work, exposure to such similar work and can read the community responses to document it in a quantifiable way that suits the data collection format.

Three days of rigorous training and field trial under the stringent supervision of SAFE experts from the Research and Planning division, was conducted to make the conducive for the objectives of the survey. The allocation of areas and assignments were predesigned for the team. The composition of the team was made equitable with women and men and sharing of responsibilities in documenting and interviewing was made rotational. The team was set with targets, reporting formats and contingency plans. They were made accessible to the survey areas by the supervisors.

The SAFE survey team members

What is Strategic Environment Impact Assessment

A Strategic Environmental Impact Assessment (SEA) is an assessment of the possible positive or negative impact that a proposed project may have on the environment, together consisting of the environmental, social and economic aspects.

The purpose of the assessment is to ensure that decision makers consider the ensuing environmental impacts when deciding whether to proceed with a project. The International Association for Impact Assessment (IAIA) defines an environmental impact assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made."EIAs are unique in that they do not require adherence to a predetermined environmental outcome, but rather they require decision makers to account for environmental values in their decisions and to justify

those decisions in light of detailed environmental studies and public comments on the potential environmental impacts of the proposal.

Purpose of Strategic Environmental Impact Assessment

The primary purpose of an environmental impact statement is to serve as an action-forcing device to insure that the policies and goals defined in the act of protecting the environment are infused into the ongoing programs and actions of the Government agencies. It shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data. Statements shall be concise, clear, and to the point, and shall be supported by evidence that the agency has made the necessary environmental analyses. An environmental impact statement is more than a disclosure document. It shall be used by the officials in conjunction with other relevant material to plan actions and make decisions.

Implementation and Experimental Design

To achieve the purposes set forth the environmental impact statements are prepared such that the statements are analytic rather than encyclopedic. Impacts have been discussed in proportion to their significance. The statements shall here state how alternatives considered in it and decisions based on it will or will not achieve the requirements of conserving the canal environment and other environmental laws and policies concerned. Further, environmental impact statements has been prepared using an interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design concurrently. The disciplines of the preparers shall thus be appropriate to the scope and issues identified in the scoping process of the survey undertaken.

In pursuing the sampling operation, canal water was collected in prescribed methods in sterile bottles from three locations of each cluster. Six samples were collected from each location and analyzed in laboratory following standard methods. The results were compiled and graphically represented for

Water Sample Analysis Report

"Water quality" is a term used here to express the suitability of water to sustain various uses or processes. Any particular use will have certain requirements for the physical, chemical or biological characteristics of water. Consequently, water quality can be defined by a range of variables which limit water use. Although many uses have some common requirements for certain variables, each use will have its own demands and influences on water quality.

Quantity and quality demands of different users will not always be compatible, and the activities of one user may restrict the activities of another, either by demanding water of a quality outside the range required by the other user or by lowering quality during use of the water. There is increasing recognition that natural ecosystems have a legitimate place in the consideration of options for water quality management. This is both for their intrinsic value and because they are sensitive indicators of changes or deterioration in overall water quality, providing a useful addition to physical, chemical and other information.

The composition of surface and underground waters is dependent on natural factors (geological, topographical, meteorological, hydrological and biological) in the drainage basin and varies with seasonal differences in runoff volumes, weather conditions and water levels. Large natural variations in water quality may, therefore, be observed even where only a single watercourse is involved. Human intervention also has significant effects on water quality. Some of these effects are the result of hydrological changes, such as the building of dams, draining of wetlands and diversion of flow. More obvious are the polluting activities, such as the discharge of domestic, industrial, urban and other wastewaters into the watercourse (whether intentional or accidental) and the spreading of chemicals on agricultural land in the drainage basin.

Water quality is affected by a wide range of natural and human influences. The most important of the natural influences are geological, hydrological and climatic, since these affect the quantity and the quality of water available. Their influence is generally greatest when available water quantities are low and maximum use must be made of the limited resource. Although water may be available in adequate quantities, its unsuitable quality limits the uses that can be made of it.

The natural ecosystem is in harmony with natural water quality, any significant changes to water quality will usually be disruptive to the ecosystem. The effects of human activities on water quality are both widespread and varied in the degree to which they disrupt the ecosystem and/or restrict water use. Pollution of water by human faeces, for example, is attributable to only one source, but the reasons for this type of pollution, its impacts on water quality and the necessary remedial or preventive measures are varied. Fecal pollution may occur because there are no community facilities for waste disposal, because collection and treatment facilities are inadequate or improperly operated, or because on-site sanitation facilities drain directly into aquifers. The effects of faecal

pollution vary. In developing countries intestinal disease is the main problem, while organic load and eutrophication may be of greater concern in developed countries. A single influence may, therefore, give rise to a number of water quality problems, just as a problem may have a number of contributing influences. Eutrophication results not only from point sources, such as wastewater discharges with high nutrient loads (principally nitrogen and phosphorus), but also from diffuse sources such as run-off from livestock feedlots or agricultural land fertilized with organic and inorganic fertilisers. Pollution from diffuse sources, such as agricultural runoff, or from numerous small inputs over a wide area, such as fecal pollution from unsewered settlements, is particularly difficult to control.

The quality of water may be described in terms of the concentration and state (dissolved or particulate) of some or all of the organic and inorganic material present in the water, together with certain physical characteristics of the water. It is determined by in situ measurements and by examination of water samples on site and in the laboratory. The main elements of water quality monitoring are, therefore, on-site measurements, the collection and analysis of water samples, the study and evaluation of the analytical results, and the reporting of the findings. The results of analyses performed on a single water sample are only valid for the particular location and time at which that sample was taken. One purpose of a monitoring programme is, therefore, to gather sufficient data by means of regular or intensive sampling and analysis and to assess spatial and/or temporal variations in water quality.

Water and human health

Water, although an absolute necessity for life can also be a carrier of many diseases. Paradoxically, the ready availability of water makes possible the personal hygiene measures that are essential to prevent the transmission of enteric diseases. Infectious water-related diseases can be categorised as waterborne, water-hygiene, water-contact and water-habitat vector diseases. Some water-related diseases, however, may fall into more than one category. Waterborne infectious diseases are those in which the pathogen, or causative organism, is present in water and ingested when the water is consumed. Most of the pathogens involved are derived from human faeces, and the diseases transmitted by consumption of faecally contaminated water are called "faecal-oral" diseases. All of the faecal-

oral diseases can also be transmitted through media other than water, for example faecally contaminated food, fingers or utensils. The principal faecal-oral diseases are cholera, typhoid, shigellosis, amoebic dysentery, hepatitis A and various types of diarrhoea. Other water hygiene diseases include tinea, scabies, pediculosis and skin and eye infections. Tinea, a skin disease, trachoma, an eye disease, and insect infestations such as scabies and pediculosis (lice) occur less frequently when personal hygiene and cleanliness are of a high standard.

E. coli (Escherichia coli) is a type of fecal coli form bacteria commonly found in the intestines of animals and humans. There are numerous strains of E.coli, the majority of which are relatively harmless. However, E. coli strain 0157:H7 is one of the most serious drinking water contaminants, responsible for numerous in North America deaths each year. Its small size (only 0.5 to 3 microns) makes it more evasive to catch in common everyday water filter systems. The presence of E. coli in water is a strong indication of recent sewage or animal waste contamination. During rainfalls, snow melt, or other types of precipitation, E. coli may be washed into creeks, rivers, streams, lakes, or groundwater. E. coli O157:H7 produces a powerful toxin which can result in severe diarrhea (often bloody) and abdominal cramps. Frequently, no fever is present. Symptoms usually appear within 2 to 4 days, but can take up to 8 days. Most people recover without antibiotics or other specific treatment in 5-10 days. There is no evidence that antibiotics improve the course of disease, and it is thought that treatment with some antibiotics may precipitate kidney complications. Antidiarrheal agents should also be avoided.

Cryptosporidium is a protozoan, a single-celled parasite that lives in the intestines of animals and humans. This microscopic pathogen causes a disease called cryptosporidiosis. The dormant (inactive) form of Cryptosporidium, called an oocyst is excreted in the feces of infected humans and animals. Cryptosporidium oocysts measure approximately 4-5 microns in size.

World Health Organization (WHO) Recommended Water Standards for Microbial Contaminants in Surface Water

Microorganism	MCLG[1] (mg/L)	MCL or TT (mg/L)	Potential Health Effects from Ingestion via Water	Sources of Contaminant in Drinking Water
Cryptosporidium	as of 01/01/12: zero	as of 01/01/12: TT	Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste
Giardia lamblia	zero	TT	Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste
Legionella	zero	TT	Legionnaire's Disease, commonly known as pneumonia	Found naturally in water; multiplies in heating systems
Total Coliforms (including fecal coliform and *E. Coli*)	zero	5.0%[3]	Used as an indicator that other potentially harmful bacteria may be present[4]	Coliforms are naturally present in the environment; fecal coliforms and E. coli come from human and animal fecal waste.
Viruses (enteric)	zero	TT	Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste
Abbreviations	MCLG	**Maximum Contamination Level Goal**		
	MCL	**Maximum Contamination Level**		
	TT	**Treatment Technology required**		

The most common symptom of cryptosporidiosis is watery diarrhea. There may also be abdominal cramps, nausea, low-grade fever, dehydration, and weight loss. Symptoms usually develop 4 to 6 days after infection but may appear anytime from 2 to 10 days after infection.

Recommended standards for coli form count and other microbial infections present in drinking water has been standardized by World Health Organization (WHO), which is also followed by the Pollution Control Board (PCB). Some of the set standards are as hereunder.

Standard Coli form count in drinking water must be 0 colonies / 100 mL

- For swimming it is fewer than 200 colonies / 100 mL
- For fishing and boating, fewer than 1000 colonies / 100 mL
- For domestic animal water supply fewer than 2000 colonies / 100 mL
- Recreational bathing or swimming can't be over 2000 colonies / 100 mL
- Boating or secondary contact can't be over 5000 colonies / 100 mL

Notes :

1. Definitions :
   A. **Maximum Contaminant Level (MCL) :** The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available Treatment Technology (TT) and taking cost into consideration. MCLs are enforceable standards.
   B. **Maximum Contaminant Level Goal (MCLG) :** The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.

2. EPA's surface water treatment rules require systems using surface water or ground water under the direct influence of surface water to (1) disinfect their water, and (2) filter their water or meet criteria for avoiding filtration so that the following contaminants are controlled at the following levels :
   - *Cryptosporidium* : (as of January 1, 2002) 99% removal/inactivation
   - *Giardia lamblia* : 99.9% removal/inactivation
   - Viruses : 99.99% removal/inactivation
   - *Legionella* : No limit, but EPA believes that if Giardia and viruses are removed / inactivated, Legionella will also be controlled.
   - HPC : No more than 500 bacterial colonies per milliliter.
   - Turbidity : At no time can turbidity (cloudiness of water) go above 5 nephelometric turbidity units (NTU); systems that filter must ensure that the turbidity go no higher than 1 NTU (0.5 NTU for conventional or direct filtration) in at least 95% of the daily samples in any month. As of January 1, 2002, turbidity may never exceed 1 NTU, and must not exceed 0.3 NTU in 95% of daily samples in any month

3. No more than 5.0% samples total coli form-positive in a month. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coli form-positive). Every sample that has total coli forms must be analyzed for fecal coli forms. There may not be any fecal coli forms or E. coli. Fecal coli form and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Disease-causing microbes (pathogens) in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. These pathogens may pose a special health risk for infants, young children, and people with severely compromised immune system.

Recommendations :

1. Immediate investigative action must be taken if either E.coli or total coliform bacteria are detected. The minimum action in the case of total coliform bacteria is repeat sampling; If these bacteria are detected in the repeat sample, the cause must be determined by immediate further investigation.

2. Although E. Coli is the more precise indicator of fecal pollution, the count of thermo tolerant coli form bacteria is an acceptable alternative. If necessary, proper confirmatory tests must be carried out. Total coli form bacteria are not acceptable indicators of the sanitary quality of rural water supplies, particularly in tropical areas where many bacteria of no sanitary significance occur in almost all untreated supplies. It is recognized that, in the great majority of rural water supplies in developing countries, fecal contamination is widespread. Under these conditions, the national surveillance agency should set medium-term targets for the progressive improvement of water supplies, as recommended in Volume 3 Guidelines for drinking-water quality.

3. Cryptosporidium oocysts have tough walls that can withstand many environmental stresses and are resistant to the chemical disinfectants such as chlorine that are traditionally used in municipal drinking water systems. Water can be filtered to remove Cryptosporidium oocysts and the cysts of another protozoan parasite, Giardia lamblia. Point-of-use filters with a filtration level of 1 micron or smaller may be used to treat the water to be used for drinking or preparing foods. They may be either attached to a faucet or have a pour-through design. The pore size of reverse osmosis (RO) membranes is also too

small for oocysts to pass through. Certain whole house ultraviolet purifiers may also provide an adequate UV dose to kill cryptosporidium, although professional system sizing is recommended.

Biological Contaminants in Beliaghata Canal water

The water sample collected from various spots along the entire stretch of Beliaghata canal were cultured in laboratory condition to take an average availability colony count of various pathogenic biotic agents. Cluster wise results are described as hereunder.

1. **Cluster I**

BELIAGHATA by-pass to Beliaghata Main Road Crossing

The stretch of this cluster shows biological contaminants in a comparatively low risk status. Cysts and Protozoan are abundantly available in the water that signifies contamination with fecal matter of man and animal. Pollution indicator zooplanktons are present and mosquito larvae are abundantly found in the location. Chances of viral contaminations in the water are not ruled out. The water renders to be of no usage other than gardening or washing.

MICROBIAL CONTAMINATION IN COLLECTED WATER SAMPLES

MICRO ORGANISMS	CLUSTERS					
	I	II	III	IV	V	VI
Coliform bacteria	L	M	H	H	H	L
Protozoans	M	H	H	H	H	L
Giardia	L	L	M	M	H	M
Legionella	L	L	L	H	M	M
Cysts	H	H	H	H	H	H
Zooplanktons	H	H	H	H	H	H
Phytoplanktons	H	H	H	H	H	H
Viral contaminants	High possibilities owing to conducive conditions					
Mosquito larvae	Abundantly found in all locations					
Dragonfly eggs	Present in many locations. Indicates highly polluted water					
Abbreviations	(H) High, (M) Moderate, (L) Low					

2. **Cluster II**

Beliaghata Main Road Crossing to Narkeldanga Main Road

The stretch of this cluster shows biological contaminants in a comparatively moderate risk status. Cysts and Protozoan are abundantly available in the water that signifies contamination with fecal matter of man and animal. Pollution indicator zooplanktons are present and mosquito larvae are abundantly found in the location. Chances of viral contaminations in the water are not ruled out. The water renders to be of no usage other than gardening or washing.

3. **Cluster III**

Narkeldanga Main Road to Maniktola Main Road

The stretch of this cluster also shows biological contaminants in a comparatively high risk status. Coli form colony count is high (> 240 / mL), which shows risks of water borne diseases and demands immediate treatment. Cysts and Protozoan are also abundantly available in the water that signifies contamination with fecal matter of man and animal. Pollution indicator zooplanktons are present and mosquito larvae are abundantly found in the location. Chances of viral contaminations in the water are not ruled out. The water renders to be of no usage other than gardening or washing.

4. **Cluster IV** Maniktola Main Road to Ultadanga Main Road

The stretch of this cluster shows biological contaminants in alarmingly high risk status with all biotic pathogens indicated in the sample in high concentrates except Giardia. Coli form colony count is very high (>510 / mL), which shows risks of water borne diseases and demands immediate treatment. Cysts and Protozoan are also abundantly available in the water that signifies contamination with fecal matter of man and animal. Pollution indicator zooplanktons are present and mosquito larvae are abundantly found in the location. Chances of viral contaminations in the water are not ruled out. The water renders to be of no usage, not even recommended for gardening or washing.

5. **Cluster V** Ultadanga Main Road to R G Kar Hospital Road

The stretch of this cluster shows biological contaminants in most alarming risk status with all biotic pathogens indicated in the sample in high concentrates except Legionella. Coli form colony count is very high (>770 / mL), which shows risks of water borne diseases and demands immediate treatment. Cysts and Protozoan are also abundantly available in the water that signifies contamination with fecal matter of man and animal. Pollution indicator zooplanktons are present and mosquito larvae are abundantly found in the location. Chances of viral contaminations in the water are not ruled out. The water renders to be of no usage, not even recommended for gardening or washing.

6. **Cluster VI** R G Kar Hospital Road to HOOGHLY river

The stretch of this cluster shows biological contaminants in low risk status with all biotic pathogens indicated in the sample in moderate to low concentrates except cysts and planktons. Coli form colony count is minimal here (>110 / mL), which shows risks of water borne diseases and demands immediate treatment as the water enters the main stream of the Ganges. Cysts and planktons are still abundantly available in the water that signifies contamination with pollutants and fecal matter of man and animal. Pollution indicator zooplanktons are present and mosquito larvae are abundantly found in the location. Chances of viral contaminations in the water are not ruled out. The water renders to be of no usage, not even recommended for households.

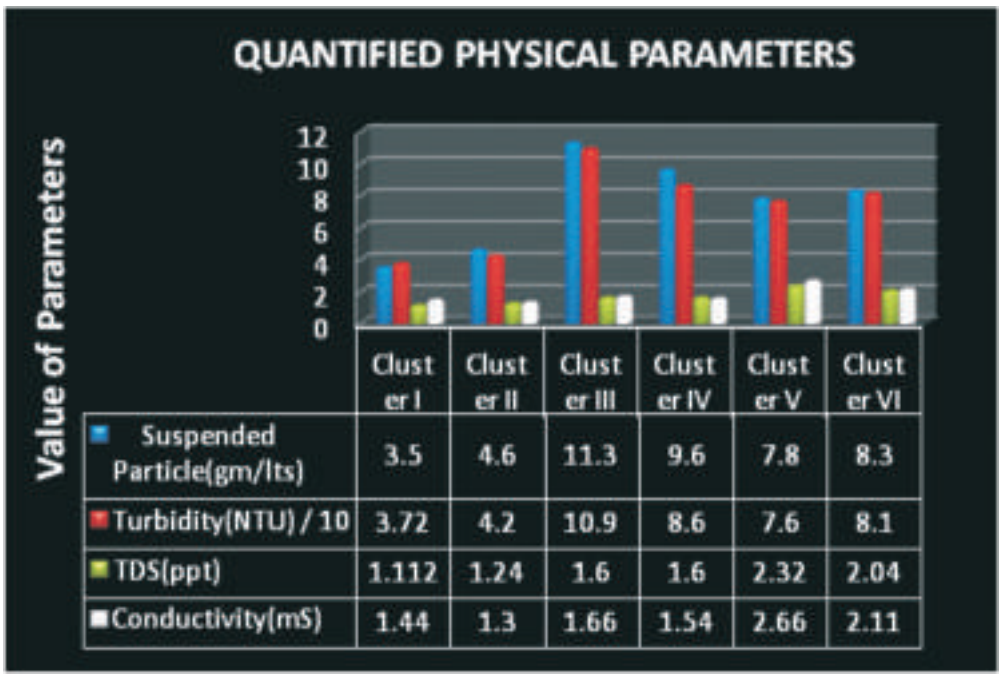
Physico-Chemical Observations on Canal Water

Health effects from chemicals in water occur when an individual consumes water containing a harmful amount of a toxic substance. Infant methaemoglobinaemia, caused by the consumption of water with a high nitrate concentration by infants (usually those which are bottle fed), is an example. The occurrence of methaemoglobinaemia is usually related to nitrate (often in groundwaters) which has been derived from extensive use of nitrate fertilizers. Fluorosis, damage to the teeth and bones, results from long-term consumption of water containing excess fluorides (usually from natural sources).

Observed Physical Parameters	Cluster I	Cluster II	Cluster III	Cluster IV	Cluster V	Cluster VI
Colour	Greenish	Greenish	Blackish	Black	Black	Grey
Odour	No Smell	Fishy	Rotten	Rotten	Rotten	Claye
Touch	Watery	Soapy	Soapy	Sticky	Sticky	Muddy
Eutrophication	Moderate	Moderate	High	High	High	Low

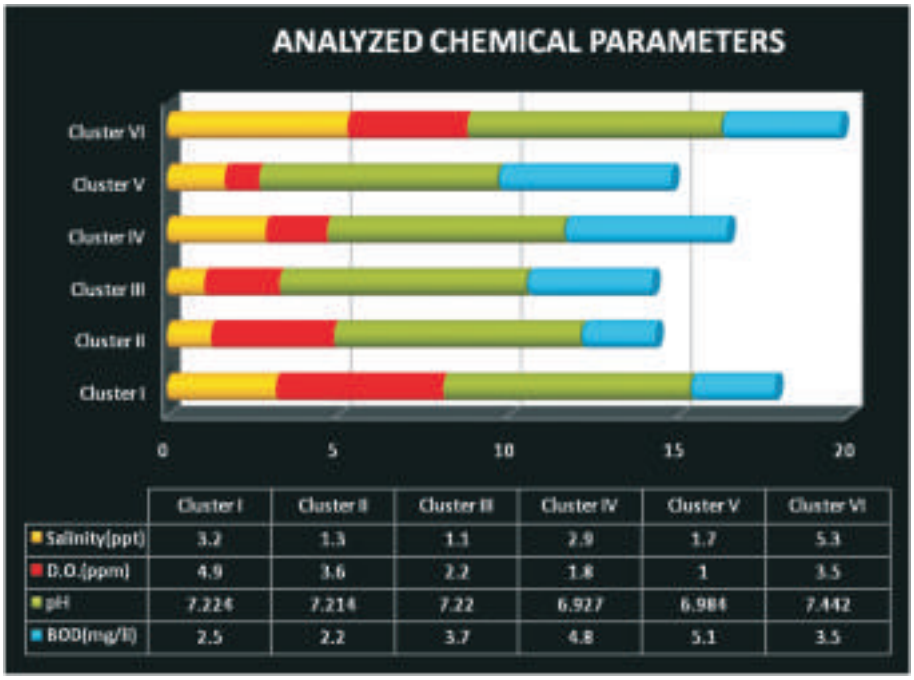
Overall physical observations of the water samples collected from various locations of different clusters shows the escalated contaminations with noxious pollutants rendering the water absolutely non-recommendable for human use. High organic nutrient load is indicated with profuse growth of water hyacinth in almost along the entire stretch except in cluster VI, where the muddy waters from Ganges reduce the nutrient load. The physical appearance varies from cluster to cluster, though cluster I & VI have comparatively better appearance compared to cluster II, III, IV, & V. The details are as hereunder.

The quantified physical parameters show distinct trends in concentration of suspended particulate matter (SPM), Turbidity of water, Total Dissolved solids (TDS) and Conductivity of water. SPM, measured in gm/litre and Turbidity gradually increases from cluster I till III and then shows a decline. However, the gradients are maximum in cluster III, IV and V. Cluster six experiences a short peak of increase owing to intrusion of mud waters from Ganges. A positive correlation between SPM and turbidity is seen all throughout the clusters. Similar trend is observed between TDS and Conductivity, which gradually increases from cluster I with its peak in cluster V. the numeric values and correlations is graphically represented below.



Analysis of chemical parameters like Salinity, Dissolved Oxygen (DO), pH and Biological Oxygen Demand (BOD) substantiate the inferences drawn from physical features of the canal water, further establishing the high degree of pollution and eutrophication. Salinity shows a decline from cluster I

till cluster III after which it rises till cluster six. It is assumed that the waters in cluster I has underground links with the lower aquifers of East Kolkata Wetlands, which is saline in nature. However, the increased salinity in cluster VI is supposedly from waters of Ganges. Though rising salinity in river water is already reported, the values need to be re-examined for validation. From Cluster I, Dissolve Oxygen recedes to a minimum value below 1 ppm in Cluster V., while flush of river water increases it by 3 to 3.5 times in cluster VI. Biological Oxygen Demand shows a regressive relation with DO as in the absence of DO the demand of oxygen by the aquatic organisms rise. High demand shows polluted conditions of water and renders it unsuitable for aquatic life. pH shows a persistant result throughout, which is close to neutral. The results are graphically shown as hereunder.



	Cluster I	Cluster II	Cluster III	Cluster IV	Cluster V	Cluster VI
Salinity(ppt)	3.2	1.3	1.1	2.9	1.7	5.3
D.O.(ppm)	4.9	3.6	2.2	1.8	1	3.5
pH	7.224	7.214	7.22	6.927	6.984	7.442
BOD(mg/l)	2.5	2.2	3.7	4.8	5.1	3.5

A serious threat is the heavy metal contamination in the canal waters. Presumable the sources of heavy metals are anthropogenic activities related to solid waste handling and non point discharge of effluents from various sources. Spotted metallic contaminations in the canal waters are detected all throughout from cluster I till VI. The threatening metallic contaminants like Lead, Chromium, Mercury and Arsenic are indicated in the table below, however the estimates are not shown as it is beyond the purview of this study. Mercury and arsenic seems to impact locally from synthetic dyes or extracted ground waters. The

QUALITATIVE GROUP ANALYSIS REPORT OF AVAILABLE METALLIC CONTAMINANTS

METAL CONTAMINANTS	CLUSTERS					
	I	II	III	IV	V	VI
IRON	Yes	Yes	Yes	Yes	Yes	Yes
SODIUM	Yes	Yes	Yes	Yes	Yes	Yes
POTASIUM	Yes	Yes	Yes	Yes	Yes	Yes
LEAD	No	Yes	Yes	Yes	Yes	Yes
COPPER	Yes	Yes	No	Yes	Yes	Yes
CROMIUM	No	Yes	Yes	Yes	Yes	Yes
CALCIUM	Yes	Yes	Yes	Yes	Yes	Yes
ZINC	Yes	No	Yes	Yes	No	Yes
MERCURY	No	No	No	Yes	Yes	No
ARSENIC	No	No	No	Yes	No	No

NB: Threatening contaminants are marked in RED and the samples are double checked with Atomic Absorption Spectrophotometric Analysis in Jadavpur University, Kolkata

concern is that all such contaminants are directly emptying out to the river waters. Bio-magnification of these contaminants are serious health hazards and needs immediate restoration and reclamation of the canal.

10 Recommended Commandments for Canal Conservation

The immediate need for conservation of the canal ecology to prevent environmental degradation and avoid massive health hazard implications in the catchment area following recommendations are suggested based on the EI Assessment reports. Such recommendations are

1. Cleaning the canal floor to re-establish the gradient of slope towards the Ganges such that the intermittent flow of water remains within the recommended limits so as to ensure proper return flow management in water reticulation system.
2. Restriction of disposals in the canal from both point and nonpoint sources, especially fecal matter of man and animal and organic nutrient load needs to be immediately installed.
3. Entry points of storm water surge and/or other grey waters needs to be pre treated before inletting the same.
4. Water recycler and pre-treatment plants needs to be established especially in cluster III,IV,& V for reclamation of the canal contents.
5. Anthropogenic stress to the aquatic environment needs to be reduced through infrastructural development so that human disposals and biotic contaminants do not drain out into the canal.
6. Water hyacinth cover and algal bloom during rains needs to be controlled and removed physically from the canal body. Phyto-remediation aspect can also be given a thought for reclamation using floating Vetiver afloat on the water bed.
7. Community awareness, campaign on sanitation and personal hygiene is very much important in ensuing community based intervention in reclaiming the canal.
8. Integrated solid waste management is equally important in the embankment areas as many non-biodegradable materials with toxic tags are directly disposed to canal waters increasing risk of contamination.
9. Vegetation cover needs to be built up along the canal bank to stabilize slope gradients rather than concretizing the embankment for beautification.
10. Regular monitoring of water quality along the stretch of canal including installation of a water aeration system is recommended for good ecological health of the canal water. The aeration system can be made through water sports after reclamation that can earn revenues for canal maintenance.

Sociometric Study & Analysis of Beliaghata Canal

Reviewing survey reports on social, economic and ecological dimentions

The entire stretch of Beliaghata canal from Chingrighata to Bagbajar, where it enters river Hooghly was selected for a sociometric survey and social audit. The whole stretch was arbitrarily divided into six segments, termed as 'Clusters' to ensure feasibility in study and survey based on length of the stretch. Interestingly the clusters showed prominent variance in socio metric feature and stratification which revealed interesting and exceptional findings about the canal. These are illustrated and explained as hereunder.

We present the analysis of the study based on various social, economic and infrastructural parameters to compare and contrast the features of each cluster to facilitate the preparation of a comprehensive report. The stretches of the clusters are detailed next page :

- **Cluster I** : **BELIAGHATA** *by-pass* to *Beliaghata Main Road Crossing*
- **Cluster II** : *Beliaghata Main Road Crossing* to *Narkeldanga Main Road*
- **Cluster III** : *Narkeldanga Main Road* to *Maniktola Main Road*
- **Cluster IV** : *Maniktola Main Road* to *Ultadanga Main Road*
- **Cluster V** : *Ultadanga Main Road* to *R G Kar Hospital Road*
- **Cluster VI** : *R G Kar Hospital Road* to **HOOGHLY river**

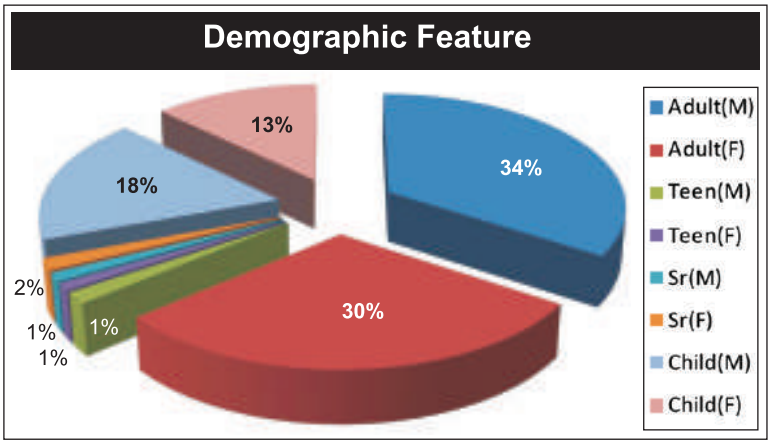
Demographic feature and Socio-economy

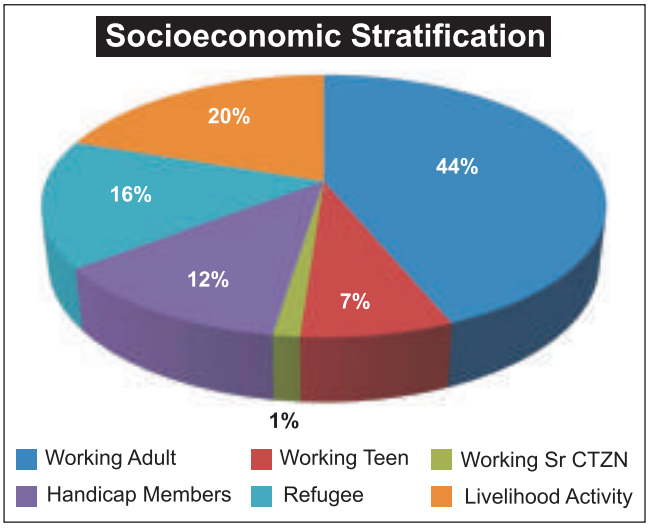
The demographic feature and socio-economic stratification in all the six clusters where surveyed and analyzed. The result shows a statistically co-related data which is represented cluster wise followed by an overall analysis as hereunder.

Cluster I

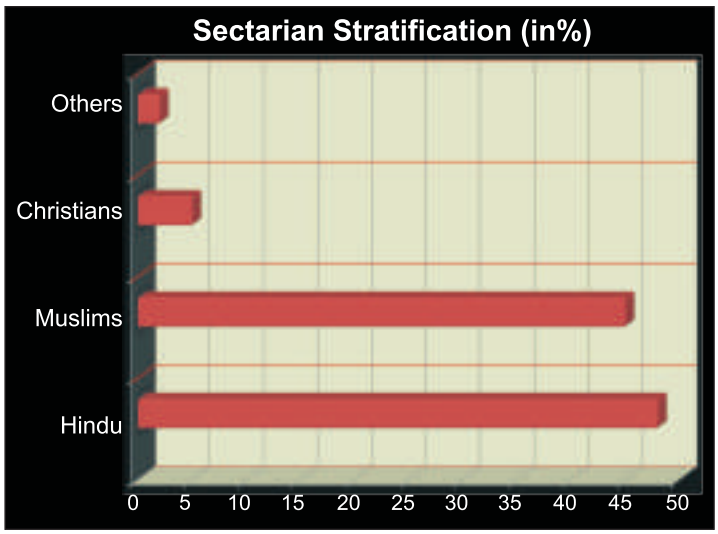
BELIAGHATA by-pass to Beliaghata Main Road Crossing

It has the smallest number of household ranging from 185-200 in which every household has an average of 5 members. Total population ranges between 3200 to3500 persons. 37 percent of the members are adult male and 23 percent are adult female while teen male and female or senior citizens make a mere 0.02-0.04 percent of the stock. 15 to 17 percent of children present in the community shows an inverted growth pyramid of age leading to exponential increase in population within next three years whence the teen age section will dominate the reproductive stature of the community. The working members are expectedly from adult group constituting 34 percent of



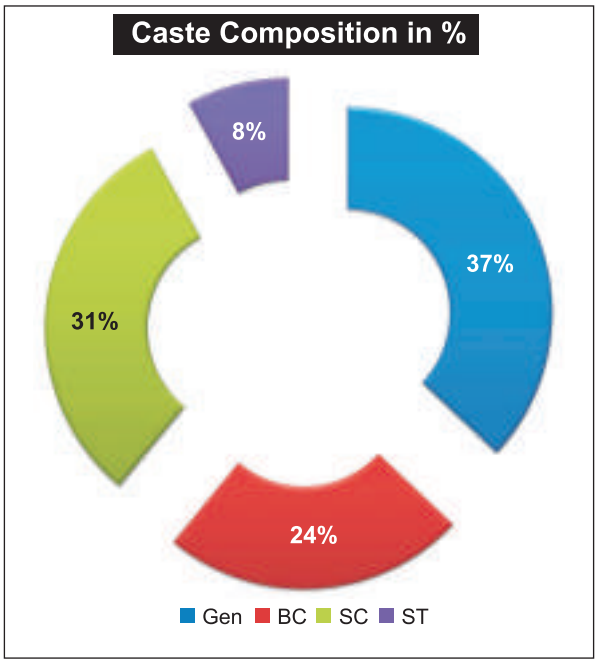


the total stock while the rest shows a range of 0 to 0.6 percent. Expectedly the main workforce constitute of adult male and female members. The cluster has indicative features like 17 percent are refugees from adjacent states, mainly Bihar and 2 percent of the members are physically handicapped. It is important to note that the socio-economic strata are dominated by Hindus belonging to general class and residing in the habitat mainly for a shelter. Only 2 percent assumably make their livelihood from this habitat.



Cluster II
Beliaghata Main Road Crossing to Narkeldanga Main Road

This cluster has a larger span with 588 to 600 households but the socio-economic stratification is very much similar to cluster 1. The points of exceptions are mainly in the reduced numbers of migrants (9%) seeking refuge from Bihar, Sundarbans and Bangladesh, who are mainly Muslims belonging from backward classes. About 6 percent of the community survives for livelihood and the rest inhabit the area for a safe shelter.



Cluster III
Narkeldanga Main Road to Maniktola Main Road

It is in every possible way similar to cluster 2 and seems like a extension of the same with a total number of households ranging from 600 to 650.

Cluster IV
Maniktola Main Road to Ultadanga Main Road

It is the most populated cluster with 1145 households having nearly 37 percent of the population as the adult male and 12 to 13 percent of children. The inhabitants are mostly migrated from Sundarbans and are dominated by lower cast Hindus (SC 43%). The range of handicapped members is maximum in cluster 4 appearing as 17 percent whereas people taking refuge from other states constitute only 7 percent of the inhabitants.

Cluster V

Ultadanga Main Road to R G Kar Hospital Road

It is demographically similar with exceptions in number of refugees (17%) from Bangladesh and Sundarbans, who are an equal mix of Hindus and Muslims belonging to either general, or scheduled cast.

Cluster VI

R G Kar Hospital Road to Hooghly river

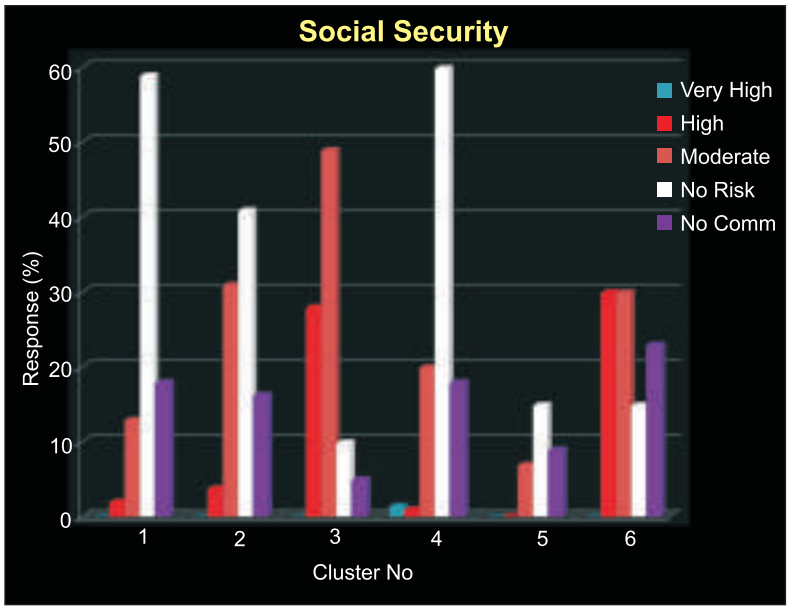
It is moderately stable cluster with 500 households but the demographic feature is very much similar to that of other clusters. Few striking features are the maximum numbers of working members (40% adults) and nearly 7 percent teen members. The social composition is dominated by Hindus with various casts and economically the cluster is depended on expert transaction of materials leading to economic compensation. The main are mainly from Bihar and Sundarbans.

The overall preview shows a number of similarities and number of contrasting features amongst the demographic and socio-economic stratification of the clusters in the entire stretch. These are illustrated in the accompanying graphics.

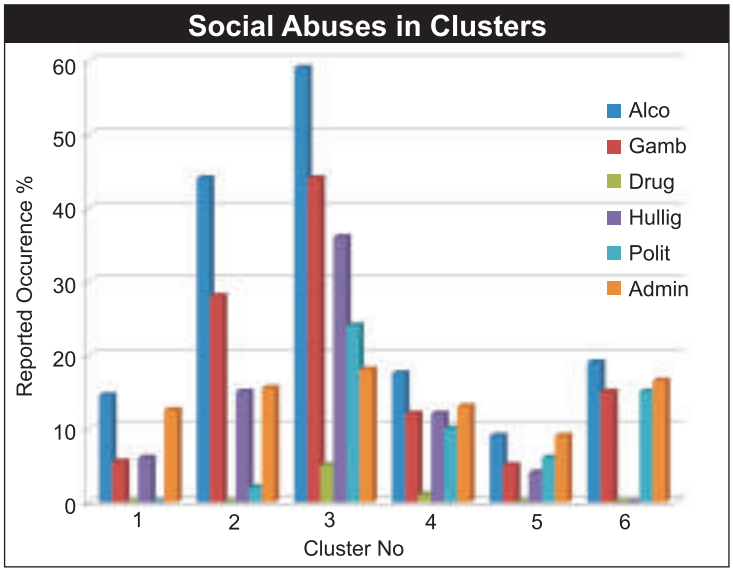
Societal Survey Report

Social features consisting of social assurance and security social abuse, identity of existence and extended social services implicate an overall picture of the clusters.

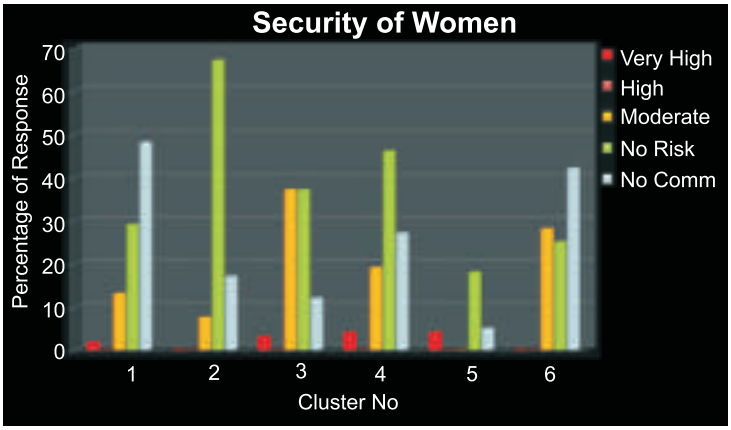
- **Social Security :** the response collected in a five point scale about social security of the inhabitants shows that it is threatened to the maximum with a high risk in cluster 3 and cluster 6, wherein cluster 1, 2 and 4 has minimal social risk. However a large number of respondents either hinted about moderate risk in cluster 2 and 3 or negligible risk in cluster 1 and 4. The data is illustrated in the graph herewith.



- **Social Abuse :** The elements of abuse in the society are dominated by alcoholism, gambling and hooliganism followed by political and administrative interferences. However the consumption and promotion of drugs are fortunately negligible in size. A comparative analysis of social abuses in clusters is represented in the graphical statement on the right. It shows that cluster 3 is most vulnerable with maximum drugs peddlers followed by cluster 2 and cluster 6, while 1 and 5 are in a better state of social composition.

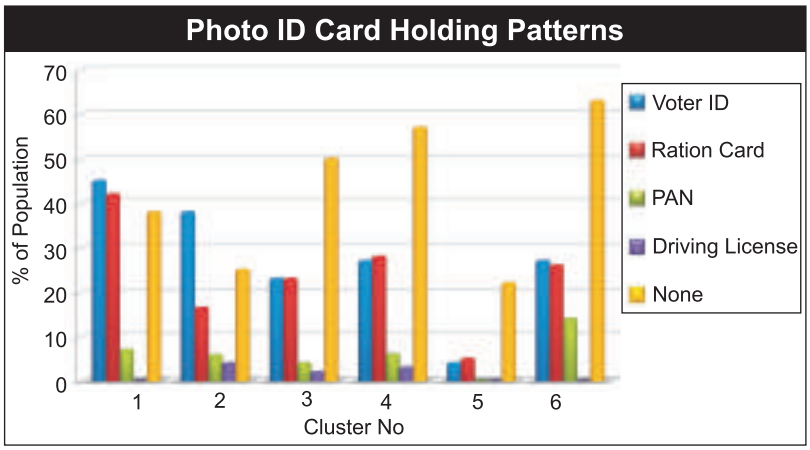


- **Security of Women :** Interestingly the risk perceived in relation to the security of women in various clusters does not show positive statistical correlation with the patterns of social abuse in the slum community. Evidently this hints about a separate noxious of human trafficking and flesh trade all along the canal. This is factually obtained from the survey report showing very high risk in cluster 3, 4 and 5 and high to moderate risk in cluster 1, 3 and 6. Comparatively safe clusters are 2 and 6 who are economically stable. It is deductable that external agents ply with vested interest for flesh trade and transaction of drugs especially in cluster 3 and 6 which needs immediate attention of the administration.



- **Social Identification and Recognized Citizenship :** The matter of social identification and recognition of citizenship of the inhabitants of the slum areas is depicted as the presence or absence of photo ID- Cards issued by Government authorities. It is noted with the clarity that voter ID card and ration card are significantly represented in the community followed by PAN card and Driving license. The most helpless figures are found from cluster 5 followed by cluster 2 and 3. Whereas cluster 1 mostly have photo ID cards of the inhabitants and Cluster 2 and 6 have moderately recognized members in the community. It is important to explain that the maximum numbers of persons with no photo ID proofs are in cluster 6 followed by

cluster 4 and 3. This data covers more than 60 percent of the total stock. Comparatively in others clusters the range of persons having no ID proofs lies below 40 percent of the total stock. The comparative graphics can be visualized in the graph



- **Municipal Services :** Availability of municipal services is an indicator to social upliftment and mainstreaming. Perusal of data analysis shows that the services are highly extended in cluster 3 and 4 and lowest in cluster 5. It also shows that only 30 percent of the people present in the slums are facilitated with proper municipal services.

Economic Status of the Inhabitants

The economic status of the people is overviewed with few indicators directly related to habitat, livelihood and economy, lifestyle and basic amenities like drinking water, sanitation and education. It is to be noted that the living cost ranges from INR 1750 to INR 4770 while the monthly income ranges from INR 2535 to INR 990. The most advantageous economy per se is in cluster 4 where they can make an average of INR 235 to INR 990 as an economy per month. The most affluent sector is cluster 6 with a maximum turnover but reduced profit ratio, whereas with a lower turnover, cluster 4 makes a larger profit owing to increased number of business holders.

- **Habitat :** The habitat stability in every cluster has been measured with maximum numbers of permanent slums, temporary habitats, or night shelters supplemented with the status of habitat ownership. It is interesting to note that while cluster 2 and 4 has the maximum permanent slums and cluster 1 and 5 has the maximum temporary slums, the possession of

Cluster Nos.	Habitat Stability					Habitat Ownership				
	Permanent Slum	Temp Slum	Night Shelter	Not Fixed	House	Rent	Lease	Possn	Partner	Own
1	21	65	6	0	0	7	0	71	0	17
2	55	35	0	5	1	26	1	46	2	19
3	47	47	0	6	0	5	0	55	0	30
4	56	42	1	0	1	0	0	55	0	35
5	32	68	0	0	0	0	0	96	0	0
6	23	48	5	0	18	33	0	48	0	10

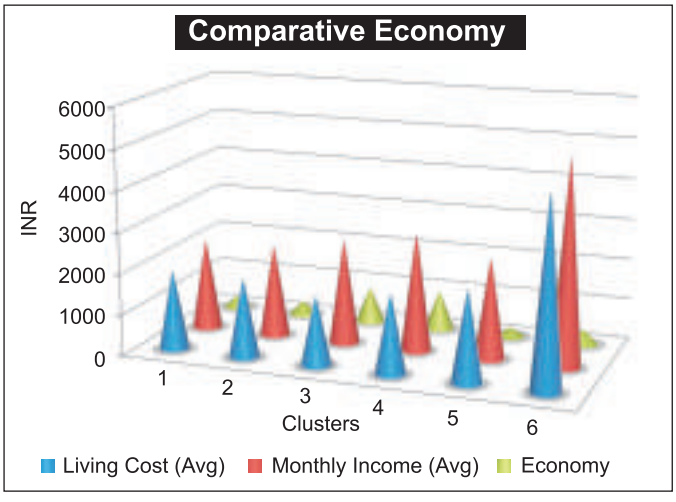
slums is maximum in 1 and 5 while the ownership is maximum in cluster 3 and 4. This depicts that the acquiring of a habitat in the slum is more of a possessive right than a legal authority on the possession. This is very important in regard to the rehabilitation of the inhabitants wherein legal rights of possession are much fewer than the physical dominance of the inhabitants in the slum.

- **Approach to Livelihood :** The existing livelihood pattern shows a major inclination in small scale industry sector as evidenced from the data showing cluster 4 as a maximum contributor to SSI followed by cluster I. The trade that takes over SSI is solid waste handling, which actually refers to segregation of solid waste, sorting and disposal. While cluster IV leads in associated works with small scale industries. Cluster II has the lead in solid waste handling; otherwise various clusters are engaged in different livelihood options which also include salaried jobs and collection of solid wastes. The range of alternative livelihood is meager and the inhabitants showed eagerness to new economic opportunities if supported with capacity building, credit linkage, and structured marketing opportunities. The range of interests towards alternative livelihood was from 54% to 64% amongst the clusters.

- **Economic Conditions of families :** The economic conditions of families show that the margin between costs of living and average expenses per month are smaller and varies seasonally. The distribution of profit is non-equitable and the average values include only the commons who remain economically challenged. 2-5% of the inhabitants show huge economic turnouts and enjoy much larger profit shares than others, who usually work on regular contractual jobs or deals to get an average pay-out in per day basis.

Cluster	Living Cost (Avg)	Monthly Income (Avg)	Economy
1	2000	2310	**310**
2	1980	2325	**345**
3	1750	2646	**896**
4	2000	2990	**990**
5	2300	2535	**235**
6	4770	5165	**395**

Perusal of results shows that Cluster 5 is economically most vulnerable with minimum economy margin of INR 235 per month per family owing to higher cost of living. While cluster 1 has the minimum average monthly income of INR 2310, Cluster 6 tops in income range with INR 5165 per family per month. Cluster 2 has the minimum cost of living and cluster 4 has the maximum economy margin.



- **Basic Amenities :** The basic amenities relates to facilities for a common urban life made available without any extra financial implications for the benefit of the community. These amenities include supply of electricity and water, protection against external disasters, maintenance of hygiene and sanitation and access to education system. These segments are dealt separately in the following paragraphs:

The social parameters reflecting inclusive development and empowerment can be identified through few indicators of which one is child labour. Perusal of results show that following interpretations of collected data relating to this as hereunder :

- Cluster 2 shows 14% of the children engaged in household works while 5% work as private child labours with 10% of the children working as ragpickers and 20% engaged in various non remunerative works.
- Cluster 1 shows only 12% as school goers and the rest of the children are astonishingly not accounted for in any socio economic strata.
- In other clusters the average number of children attending school ranges from 45% to 80% while engaging children in child labour exists parallel to this with reported figure 6% to 10% of the total stock.
- It is evident from the collected data that information gaps and deliberate introduction of wrong inputs of the respondents shows a vested interest hiding the status of children in various clusters.

Supply of electricity

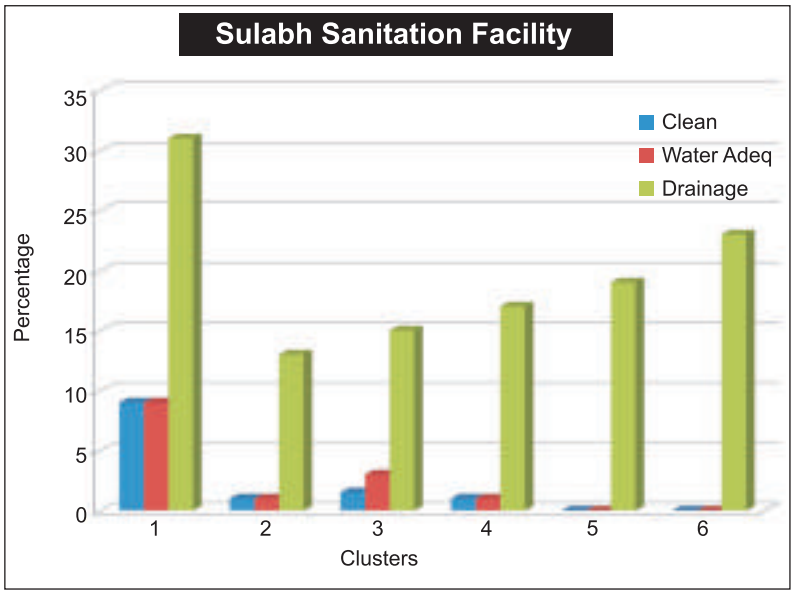
The respondents expressed that the access to supply of electricity is meager. At the maximum 48% are connected to the grid in cluster 3 followed by 48% in Cluster 2 while the minimum accessibility of 7% exists in cluster 5. The average monthly expense ranges INR 70 –INR 417 depending on the duration and type of energy supply. A number of persons in cluster 2 and cluster 5 are connected to private suppliers from diesel run electricity generating units.

Supply of drinking water

Reportedly the maximum availability of drinking water exists in Cluster 3 with a minimal availability in cluster 1, 2 and 5. The supply is mainly based on Tala links with additional supplies from Palta in Cluster 2 and Cluster 6. Other than this, municipal supplies or deep tube wells are present in cluster 2 area providing a meager supply. The average distance covered by the inhabitants to access water is more than 50 meters which at the maximum is in cluster 5 ranging to 80 meters of distance. Inhabitants pay off at an average of INR 5-15 per month for collecting water. As reported the distantly accessible water source has a frequency of two times a day on average, flowing for a span of 2 hours 30 minutes in each delivery catering to 300 persons in every term. The opinion poll on demand fulfillment of supply of water shows good supply Cluster 1 and Cluster 4 and worse supply in 3 and 5. Rest of the clusters have an average delivery of water though this do not suffice for the water to clean sanitation units.

Sanitation & Hygiene

Casting of opinion by the inhabitants of different clusters shows comparatively under privileged condition of the inhabitants in regard to sanitation. Temporary sanitation units that are equivalent to open defecation in the canal water are the most common facilities. The advantage being in minimal use of water for cleaning, permanent and self made toilets are in cluster 2 with minimum number of temporary toilets though water availability for sanitation is one at its poorest state. The maximum number of open sanitation facilities are in cluster 4 where the number of inhabitants are also the maximum. Unfortunately, this cluster also receives one of the poorest supply of water for sanitation. The following tables show an elaboration of hygiene, cleanliness and sanitation in tabulated form.

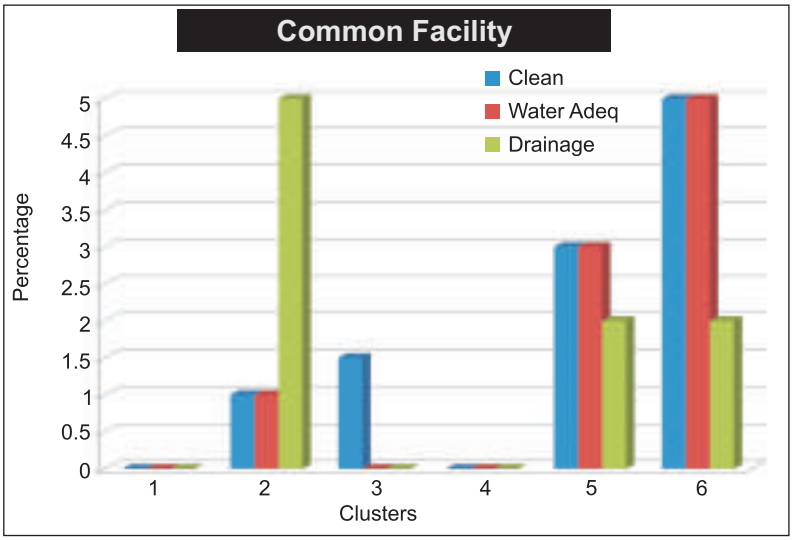


Sulabh sanitation facility is available mostly in cluster 2, 3, 5 and 6 which is being availed by less than 40% of the inhabitants who can afford to pay INR 35-50 per month to enjoy the facility. Otherwise 40%-85% inhabitants use self styled common sanitation that are deficient in hygiene and water adequacy. A comparison of cleanliness, water adequacy, and proper drainage in Sulabh sanitation facility is shown in table beside.

Use (in %) of Sanitation Facility

Cluster	Sulabh Facility	Common Facility	Open Defecation
1	0	91	High
2	42	74	Moderate
3	16	40	Low
4	0	87	High
5	27	50	Low
6	23	78	Moderate

While in cluster 1 the drainage for sulabh sanitation and common minimal facility are equally good, cleanliness and water adequacy are better in cluster 1 Sulabh sanitation and Cluster 2, 5 and 4 of common minimal facility. Cluster 1, 3 and 4 has the worse available infrastructure for facilitating with cleanliness, sanitary waters and drainage.

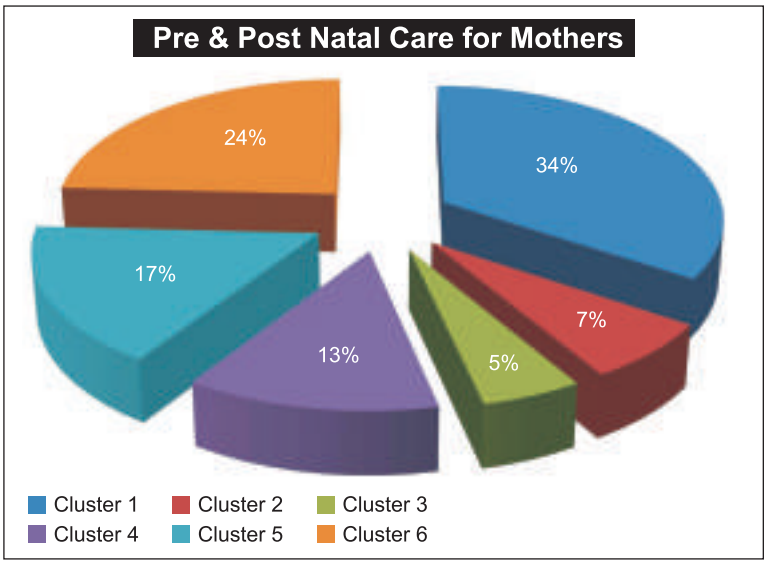


Open defecation system is used all along Beliaghata Canal as a major sanitation facility

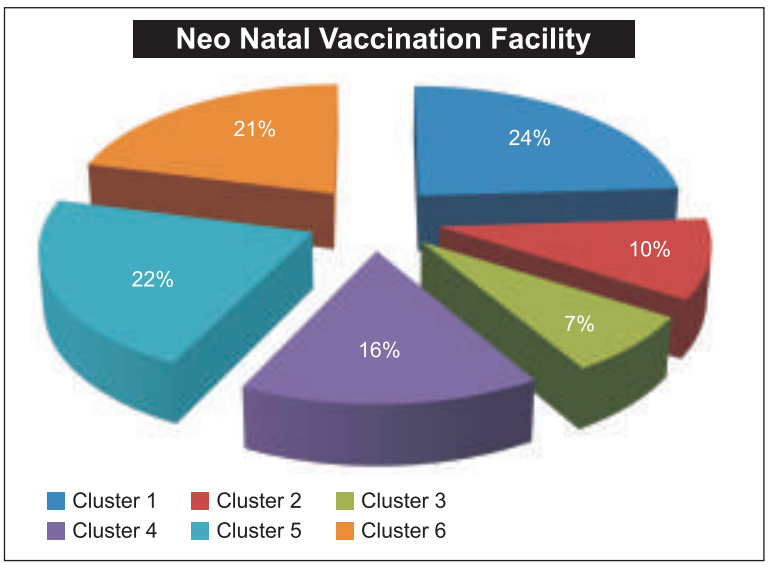
Health & Nutrition

General health facility is below prescribed standard in the inhabitated area. Awareness is poor and situation demands immediate scrutiny and care to avoid major dissemination of diseases with potential threats. In average 66% inhabitants responded positively about health facilities extended by government sector, of which 22% confirmed about free medication facility and 43% negated it. Rest were unaware of the situation. Private and voluntary supports are meager and only 9% on an average confirmed for this. Private facility or voluntary supports with medication facility is sporadically available and only availabl to inhabitants of cluster 2 & 3.

When the conditions of health services were adjudged with two very strong indicators namely pre and post natal health care for carrying and lactating mothers and availability for neo-natal vaccination facility, it was astonishingly found to be the worst in Cluster 2 & 3. The comparative data on this for every secor is given as hereunder.

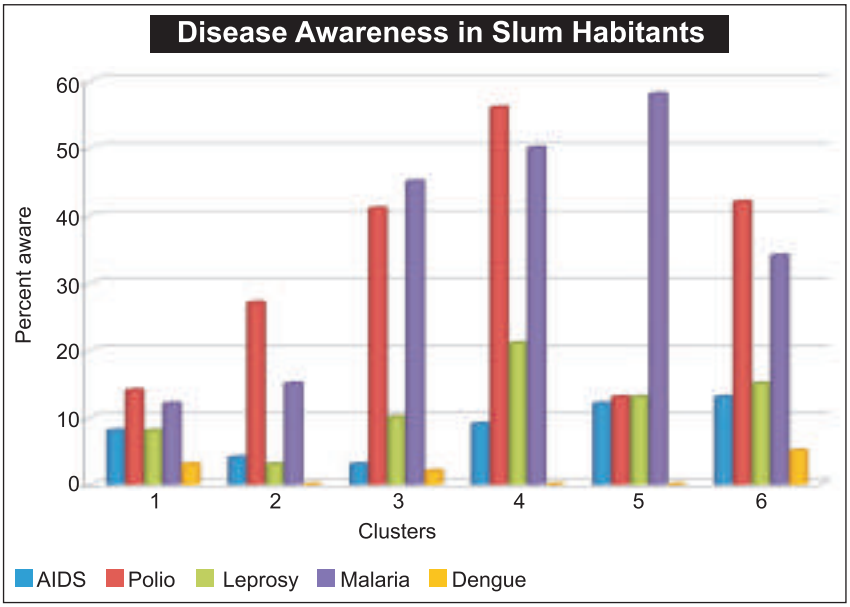


On reviewing the disease awareness status of the inhabitants on expected disease threats in the area, it was found to be poor, especially in Cluster 1 & 2. Awareness on Polio and Malaria was satisfactory while on AIDS and Dengue fever it was very meager. A comparative analysis of the awareness scales for various clusters are as hereunder.



Disease references in both adult and children are mostly abdominal

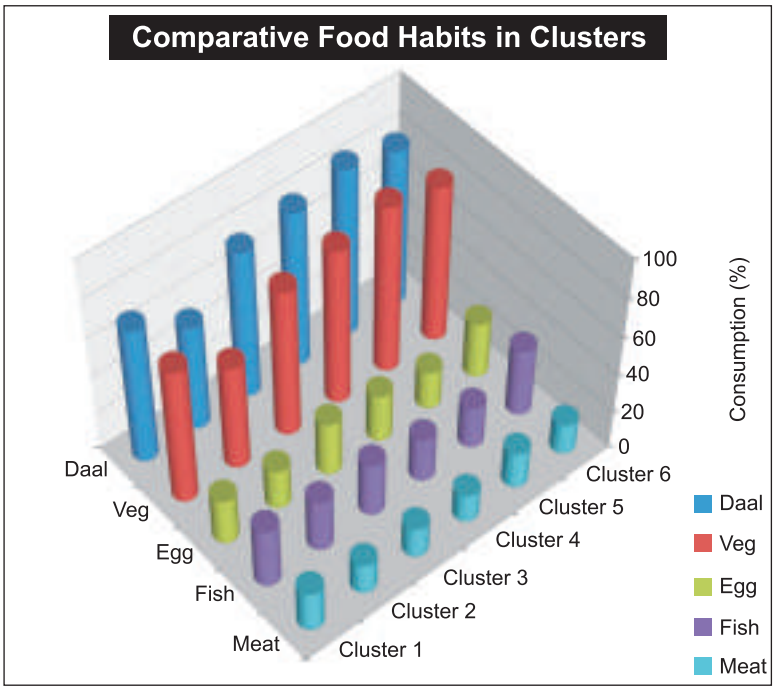
problems (47%), Skin infection (29%) and fever. Malarial fever and fever of unknown origin are persistant. References of disease are more from clusters 1, 2 & 4, where open defecation is practiced mostly. References of worms in children or amoebiosis are common that referes to disease contamination through water. Fortunately references of Typhoid fever, Hepatitis or Tuberculosis are almost absent in the survey. This reduces the graveness of the situation to certain extent.



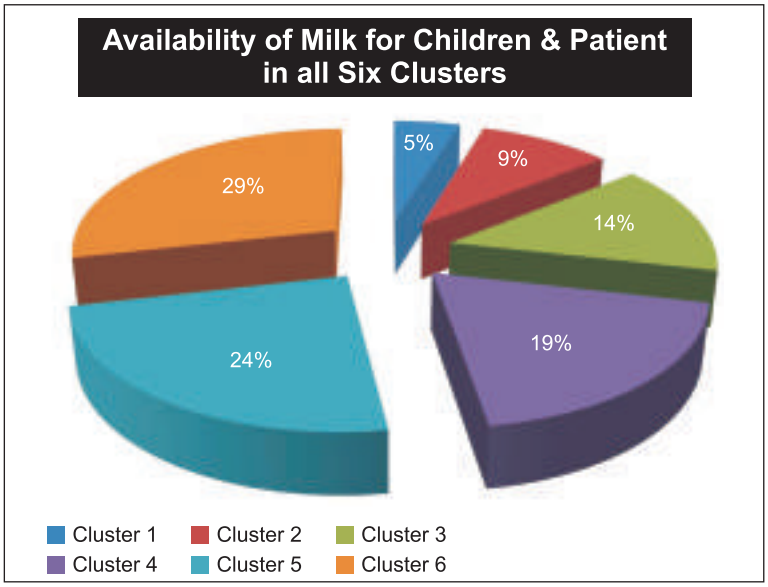
Overall references of accidental death is maximum in all clusters, while child death and death of pregnant women are alarming in cluster 2.

Nutrition

Nutrition is directly recognized with economic conditions of a community. Here overall situation is more or less satisfactory in regard to nutrient inputs in daily food requirement and micronutrient deficiency syndromes are quite rare to observe. Except in case of Cluster 5, the community members usually have 2-3 meals a day but skips breakfast or snack. Average meal consists of Pulses and vegetables mainly with rice. 83% are rice consumers and 23% consume wheat or gram flour. It is evident from the data that 6-7% have mixed cereals to balance their diets, which is good for health. Fish and egg are consumed 2-3 days per week on an average and atleast once in week they prefer to consume meat in the



main meal at night. The proportionate consumption ratio of select food is depicted as hereunder.



Conditions in cluster 5 needs a reference in this regard since it has the worst nutritional condition compared to other clusters. Nearly 30% inhabitants are uncertain about their meal and assumably many either skip meals or else have just one meal a day. This can be correlated with the economic conditions of the cluster having the least margin in income and expenses. Another nutritional indicator adjudged here is availability of milk to the children and pregnant women. The results are not satisfactory though, the condition of Cluster 5 is worst. The accompanying pie chart explains the situation.

Education

Access to education is poor and totally subscribed with government support and infrastructure. Access to primary schooling is available in all clusters though on an average 25% inhabitants only use the facility. Access to lower secondary and higher secondary education has been reported only from Cluster 3 & 6. Private or voluntary efforts towards outreach and extension education or adult and continuing education is absolutely missing in the entire stretch. Even if present, they are out of bound for the slum dwellers owing to cost of education and social exclusion.

Interestingly the section of inhabitants who are using the facility are satisfied with the same. 94.5% inhabitants responded affirmatively about the mid-day meal programme and 63% expressed satisfaction to teaching quality. However they also referred to deficiency of teachers and poor infrastructure.

A comparative analysis of the clusters in regard to percentage of school goers, expense in education per family per annum, percent of children who avoid

schooling and play around and rate of access to primary education facility (in percent of responses), shows interestingly correlated data that is plotted below in the table.

Data shows that no of school goers is least in cluster I may be owing to higher expenses in education and lesser access to primary education facility, however not many children do play around and presumably child labour is practiced in guise. Out of 35-40 children (17% of total habitants) present in the cluster, only 2% play around 12% reach the school, rest 86% (tentatively 30 children) are engaged in unknown work as they do not access any mainstream work. Cluster 5 has the maximum no of school goers and also has maximum accessibility to schooling system, even the cost of education is low. However, it is presumed from the level of nutritional data that mid-day meal is a good attraction for the children to attend school in cluster 5.

PARTICIPATION RATIO TO PRIMARY EDUCATION FACILITY (in %)

Cluster	No of School goers	Av. Education Expenses (per annum in INR)	Play around	Access to Primary School
1	12	700	2	17
2	48	718	33	26
3	60	680	20	22
4	46	450	15	25
5	79	360	22	32
6	63	600	6	30

Executive Summary of the Survey Results

An overview of the socioecology of Beliaghata Canal...

Overall review of the survey results reveal an unstable sociological dimension of the settlements and slum along the entire stretch of Beliaghata canal. It is significantly vulnerable and draws attention on serious issues pertaining to deteriorating conditions of health and sanitation, economic disparity and societal imbalances instituting a precedence that is most unlikely to align with the upcoming global image of Kolkata metropolis. The city of joy ends here with discomforts in inhabitable slums made by the urban poor in desolation and sheltering illicit acts for survival in steep economic challenges. The dwellers need resettlement and proper rehabilitation, but much before that they need to be mainstreamed to understand the difference of being rehabilitated to proper life and lifestyle.

General overview of the habitation shows that the dwellings are long term settlements that took its own course to develop and evolve. Mostly people have attained possession of the slums and do not


Photograph : © of SAFE

have authoritative holdings. The existing system is awfully tight and few only could creep in as tenants or partners for using the shelter. Intense temporary arrangements for night shelter and shelter from natural calamities are just makeshift arrangements that produce a floating population and a buoyant trade purpose. Thus economic upliftment of the inhabitants do not always assure infrastructural betterment of the habitat. The social conditioning is so strong and the societal condition is so fragile that the motive to leave with a better lifestyle hardly arises. The same implies to sanitation and hygiene conditions. Open defecation is equally practiced in areas of low income and in areas having comparatively better economic prospects. Health awareness is meagre to evoke investment or community collective enterprise for better standards of sanitation. The same casual attitude is observed for other basic amenities like child health and immunization, drinking water quality, accessibility to health and education institutions for care and career or supply of power and social protection. It is almost like a transit camp for a journey for economic transition rather than life and livelihood.

Observations from participatory vulnerability analysis (PVA), peer group activity and collective brainstorming by the beneficiaries, while undertaking the survey, revealed interesting correlations that are statically examined and accepted within a 5%range in analysis of variance (ANOVA). This shows that the population is at its peak reproductive stage and would expectedly flourish in the coming years increasing pressure on the habitat and further steepening the economic crisis. In present scenario, economic stature is defining the social status but not determining the lifestyle, either by choice or by compulsion. This raises questions over the social security and


Photograph : © of SAFE

assurance too, which has already been found to be vulnerable in the statistical interpretation. However, communal harmony and conjoined attitude is well marked in the area. The purpose to survive has a bonding network to assimilate the differences of caste and creed.

Since more than 50 percent of the settlers arise from non aboriginal stock especially from other states of Eastern India and Bangladesh, they make semi permanent settlings to survive. Permanent settlers, those are from near about places like 24 Parganas (South) district or Sundarbans, are low in number and are economically challenged or socially excluded, who has been using the area for shelter and protection. The floating population is interestingly found to be within the upper strata of middle income groups with few exceptionally in affluent strata and is politically well connected. The occupation and trade has a dimorphic character with one segment engaged with the service sector and micro utility retailing. This segment has fluctuating income varying with seasonal demand of the service sector. The other sector is engaged as associates of small scale production units or in solid waste segregation and sale; that has an amazing volume of trade. In the disguise of these trades a huge financial transaction is supported by illegal and unaccounted traffic of restricted materials. The varied socio economy is an important determinant in actualizing the rehabilitation of the settlers as the attitude to rehabilitation remains divided on the question of economic security. The X-Y scatter analysis shows confused state of decision in varying strata and in various clusters in regard to rehabilitation or resettlement.

In reviewing basic amenities to survive, it is found that situations are in compromising state in every sphere of it. The main source of drinking water is municipal supply from common delivery points at a distance varying from 5 to 50 meter in most of the stretch. A bulk of residents purchases water for drinking purpose from vendors who supply drinking water of compromised quality. The supply is scanty, irregular and do not adhere to WHO standards. References of waterborne diseases and other health hazards are also found in number of data sheets. The situation is highly demand driven and not found reciprocal to the socioeconomic condition of the dwellers. Overall sanitation arrangement in the locality do not comply with the set national standards and infrastructure facility demands immediate overhauling to avoid health risks. In some parts of the stretch there are common sanitation facilities that are not hygienically maintained and stand insufficient in capacity. Alarmingly, open defecation in self styled sanitation units on the backyard of the settlements empties out to the canal water. Male members and children habitually practice open defecation on the bank of this canal. There is enough risk of vector carried diseases, infections and health risks owing to compromised sanitation situation. Social stigma, unhygienic habits and lack of water supply makes the overall situation grim and alarming. The canal water is highly turbid with

overloading of putrefying organic matter. The biological oxygen demand and chemical oxygen demand is very high that renders the water unfit for biological habitation. Physical colour, odour and consistency are highly variable and not recommendable for general purpose use as well. The command area apparently seems to be a solid waste dumping ground as it hosts the activities of a number of waste workers. As such there is no structured solid waste management system installed and used by the settlers. The area is used for collection, dumping, segregation, sorting, and delivery of dry solid waste that includes restricted categories that are ecologically harmful. The backyard of the settlement releases huge amount of non degradable solid waste including plastic and thermocol to the canal water that occasionally chokes the water flow developing into puddles of polluting liquids. The settlement appears to be a halt on transit for domestic e-waste. Small scale production units are found in 40 percent stretch which are associates of nearby small scale industries. The production units are mostly assembly houses which do not use power inputs above the domestic supply level. The units are run by women labourers and men contractors as home run units. In some cases, production of effluents and wastes has been marked sparsely.

Cluster I and Cluster V shows unique correlations in economic stress and compromising lifestyle. Low income and higher expenses have reduced the options of better food, education, health and sanitation. Since the intra domain competitions are feeble so social risks factors like security issues, abuses etc are also fewer. In other clusters the security related issues and social abuses strikingly increase with the size of population and increase in economic turnover. Lack of education, awareness and ambition has led to a social blockade in the area. Though few interestingly good signs in this blockade need to be mentioned that include least references of flesh trade, sexual harassment or women molestation issues or occurrence of sexually transmissible diseases. Alcoholism and hooliganisms are common abuses. Communal harmony is another dimension that stands positive amongst all odds. However, social crimes like child labour, human trafficking and drug peddling has caught the eyes of surveyors in diminutive dimensions.

Variations in opinion and attitude are strongly felt with changing societal composition, trade and economic stature and vulnerability along the various locations of the canal. Cluster I, which is close to the by-pass has more stronger opinion for rehabilitation than cluster five, who are socially unstable and economically challenged further. The larger dimension of populace and varied composition in cluster IV gives a mixed opinion and tries to evaluate the opportunity costs and fiscal benefits in getting rehabilitated rather than continuing to stay in the same place. While Cluster VI that has more of floating population in one end and permanent residents in municipal quarters on the other has divided opinion to address the rehabilitation issues.

Summarily, the habitation and anthropogenic pressure on the canal owing to the settlements along the canal is seriously damaging the ecological frame of the canal and developing potential threats of environmental and health hazards in the heart of the city. This calls for a prudent rehabilitation programme that is community based inclusive and participatory, to save the green coefficient and the societal cause with humanitarian outlook and strategic implementations. The details of suggestive measures are discussed in the next chapter.

Scaling the Attitude of the Inhabitants

A scientific window for viewing community opinion...

The term scaling is applied to the attempts to measure the attitude objectively. Attitude is a resultant of number of external and internal factors. Depending upon the attitude to be measured, appropriate scales are designed. Scaling is a technique used for measuring qualitative responses of respondents such as those related to their feelings, perception, likes, dislikes, interests and preferences.

Methodology

The Attitude Scaling techniques for measuring data on opinion that has been gathered from respondents were analyzed with modified Likert method developed by Rensis Likert. In Likert 5-point attitude scale, the respondents are asked to indicate a degree of agreement and disagreement with each of a series of statement. Each scale item has 5 response categories ranging from strongly

agree to strongly disagree and each statement is assigned a numerical score, either ranging from 1 to 5 or it can also be scaled as -2 to +2 and the respondent's total score is computed by summing these scores. This total score of respondent reveals the particular opinion of a person or collectively represents the opinion of the community. Likert Scale is of ordinal type, they enable one to rank attitudes, but not to measure the difference between attitudes. They take about the same amount of efforts to create as Thurston scale and are considered more discriminating and reliable because of the larger range of responses typically given in Likert scale. A typical Likert scale has 20 - 30 statements. While designing this Likert Scale, first a large pool of statements relevant to the measurement of attitude was generated and then from the pool statements, the statements which are vague and non-discriminating have been eliminated. No judging gap is involved in this. The same scale was modified to a more discriminating 7-point scale to sense finer opinions and attitudes of the community. The numerical data was processed for standard deviation and analysis of variances to remove obscure trends in opinion.

Experimental Design

- **Assumptions :** The inhabitants are residing in the said area in a socioeconomically vulnerable condition, though the societal assurance, community coherence and comprehensive feelings of security is disallowing them to accept proposals of rehabilitation and social inclusion. They shall be evaluating the opportunity cost and societal benefits in the proposals and share their opinions and attitudes.

- **Applications :** The experimental subjects will be exposed to pre-defined conditions and schemes of rehabilitation and social inclusion through a set of questionnaire that scales displacement and rehabilitation in a 7-point Likert Scale, from –ve 3 to +ve 3 through zero ('0'), wherein zero defines their current status and/or indecisive response. Similar scaling was done for Social inclusion and exclusion too. The data stock from responses of the target subjects was classified statistically in software environment <Survey Pro (Version 4.2)> to deduce the trend of opinion in X-Y Scatter plotting.

- **Deliverables :** The final findings would give a trend in changing opinion patterns with varying conditions of rehabilitation, evictions, social exclusion, and displacement or inclusive resettlements. The trends in attitude change over a baseline survey assessment can be used as a decision support tool for developmental activities like restoration of the canal. The trend setters can be used for further modelling the impact of the factors in originating a certain opinion, or else in modifying a social opinion favourably.

- **Sample Questionnaire :** the following are the samples of questionnaire used for attitude scaling in 7-point Likert Scale.

A. Eviction and Displacement

1. Would you surrender to sudden eviction from this place through enforcement of law.

2. Would you surrender to step wise eviction with allowance of time from this place through enforcement of law.
3. Would you support eviction from this place against minimal compensation and time bound displacement under the enforcement of law.
4. Would you support proportionate compensation for displacement from this place with no rehabilitation plan.
5. Would you support eviction from this place with due notice, justified compensation and proper rehabilitation plan?

B. Rehabilitation & new economic opportunity

1. Would you demand for new economic opportunity and alternative livelihood options to allow the eviction process in this area?
2. Would you prepare for resettlement plans offered by the government in concurrence with the eviction process under enforcement of law?
3. Would you support due compensation for free settlement plans to be successful in this area?
4. Would you agree for a displacement to a new resettlement with better social security and new economic opportunity without any financial compensation?
5. Will you agree to negotiate on financial compensation for resettling in a new place newer economic opportunities and better societal conditions with assurance of security?

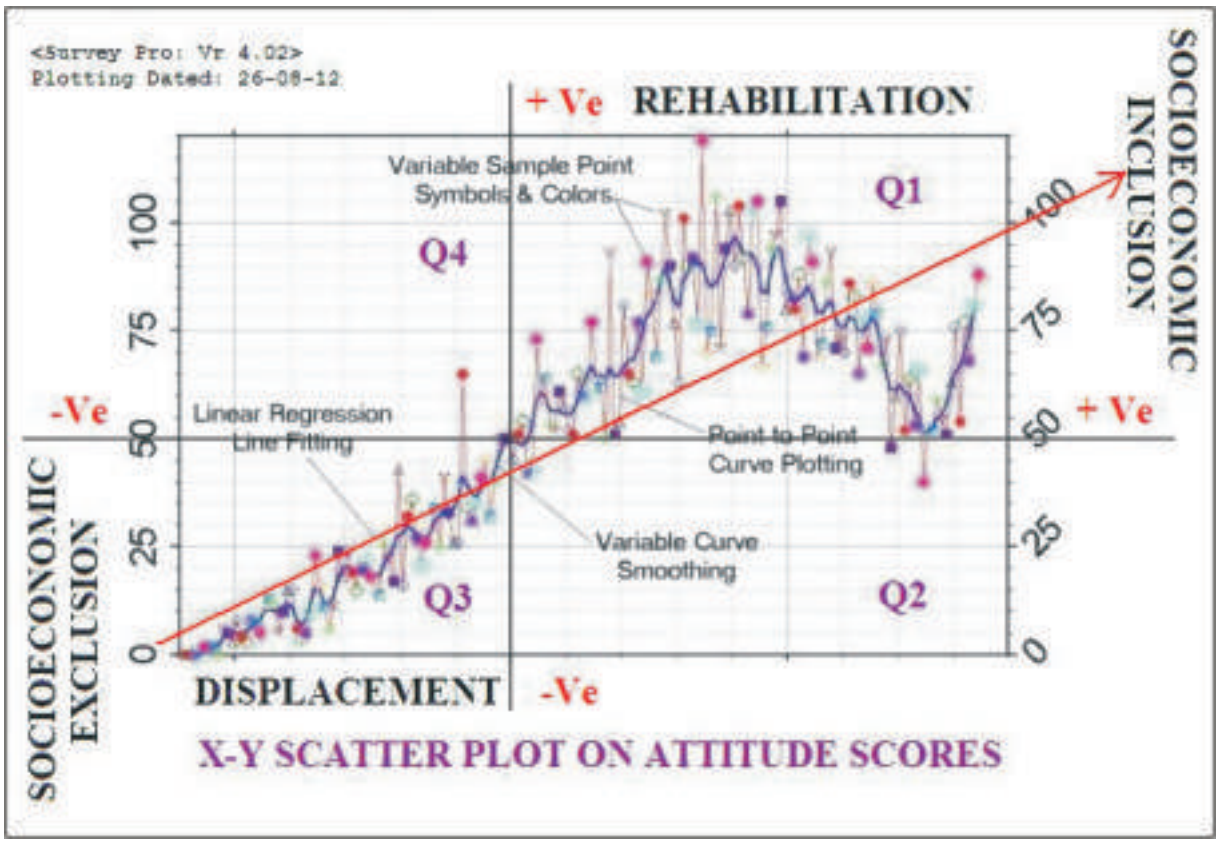
Responses to all these above questions were quantified in a 7 point scale starting with

A Strongly disagree (-3), B Disagree (-2), C Reluctantly agree (-1)
D Remain indecisive (0) E Willing to agree (+1) F Agree (+2)
G Strongly agree (+3).

–3	–2	–1	0	+1	+2	+3
A	B	C	D	E	F	G

The responses were quantified and processed in percentile assessment and X –Y scatter module to reduce the trends in attitude change. The results of the analysis and inferences thereto are stated in the following pages.

The given figure has four quadrates. The first quadrate Q1 is constituted of positive values of Rehabilitation and Social inclusion, where both are assured. Q2 is constituted of social inclusion and displacement, where rehabilitation is not assured. Q3 has negative values for rehabilitation and social inclusion, where there is no social assurance but evictions occur as a legal enforcement. Q4 has positive values for rehabilitation but no assurance for social inclusion. The responses show very distinct features that are outlined as hereunder



- No response make significant statistical presence in Q2 & Q4 showing that any eviction must come with packages for resettlement and social inclusion as well that may assure better lifestyle and new economic opportunities with healthcare and education.
- Negative responses in Q3 show strong apathy and anguish against eviction through legal enforcement or administrative pressure. 76% of the attitudes rate (-3) as against only 0.02% rated as (+3).
- Maximum positive responses are plotted in Q1, wherein it is shown that resettlement plans along with social inclusion programme are welcome.
- A remarkable feature is the range of mean deviation in Q3 (+1.7-2.0) as against mean deviation in Q1 (+7.3-14.0) amongst the responses as evidenced in the X-Y scatter plots. This shows that the decisions are more divided and contradicting in Quadrate 1 compared to Quadrate 3. The community has low confidence in assured rehabilitation programmes as suggested by the administration along with inclusive economic opportunities, whereas they are more determined (less deviant) in rejecting any eviction process by systemic pressure or legal enforcements.
- The linear regression line shows positive trends in changing attitudes with proposed resettlement programmes in the favour of the community.

Restoration of Beliaghata Canal

A Conspectus for environmental and social sustainability...

According to the United Nations, more than one billion people now live in the slums of the cities of the developing South. The future of a radically unequal and explosively unstable urban world that makes the slums is a serious concern for the development economists and environmental activists as well. From the sprawling barricadas of Lima to the garbage hills of Manila, urbanization has been disconnected from industrialization, even economic growth. Every slum in global south portrays a vast humanity warehoused in shantytowns and exiled from the formal world economy. Mike Davis, in his recent book 'The Planet of Slums', argues that the rise of this informal urban proletariat is a wholly original development unforeseen by either classical Marxism or neoliberal theory. Are the great slums, as a terrified Victorian middle class once imagined, volcanoes waiting to erupt? Davis provides the global overview of the diverse religious, ethnic, and political movements competing for the souls of the new urban poor.

It has been curiously observed that slums appear either on the embankments of the urban water

bodies, wherein they use the water resources for sanitation and household usage for free or else appears on garbage hills where the solid wastes recreate resources for their meagre survival. As such therefore the environmental and health implications are of major concerns. With reference to the context of restoring Beliaghata canal, the foremost work is resettlement of the inhabitants along the canal and environmental conservation of the water body. Many restoration projects are implemented in urban environments, where the landscape and environmental conditions have been sufficiently altered true restoration efforts aimed at achieving "natural" functions is limited and the reconstruction of pre-impact form is impossible. Under these circumstances, and in many cases where such constraints do not exist, the success of a project – as viewed by the public – is often based largely on the visual appeal of the site after restoration and its functionality for public use.

Landscaping Component

The landscaping component of such stream and riparian restoration projects needs to be emphasized given its importance of visual success and public perception. One of the purposes of this technical note is to address landscaping considerations associated with urban stream and riparian restoration projects, and provide ideas to managers for enhancing the visual appeal and aesthetic qualities of urban projects.

Attention to landscaping details for urban stream restoration projects can :

- Improve environmental awareness.
- Offer recreational opportunities.
- Provide privacy and noise control.
- Enhance visual appeal.
- Accentuate or diminish adjacent land uses.
- Minimize maintenance.
- Increase value of real estate.

Reference Ecology

The other important segment is the restoration ecology of the canal, which needs defining the reference ecosystem. A reference ecosystem serves as a model for planning a restoration project, and later for its evaluation. In its simplest form, the reference is an actual site, its written description, or both. The problem with a simple reference is that it represents a single state or expression of ecosystem attributes. The reference that is selected could have been manifested as any one of many potential states that fall within the historic range of variation of that ecosystem. The reference reflects a particular combination of stochastic events that occurred during ecosystem development.

In the same manner, an ecosystem that undergoes restoration can develop into any of a potentially large array of states. Any state that is expressed is acceptable as restoration, as long as it is comparable to any of the potential states into which its reference could have developed. Thus, a simple reference inadequately expresses the constellation of potential states and the historic range of variation expressed by the restored ecosystem. Therefore, a reference is best assembled from multiple reference sites and, if necessary, other sources. This composite description gives a more realistic basis for restoration planning. Sources of information that can be used in describing the reference include :

1. Ecological descriptions, species lists and maps of the project site prior to damage;
2. Historical and recent aerial and ground-level photographs; remnants of the site to be restored, indicating previous physical conditions and biota;
3. Remnants of the site to be restored, indicating previous physical conditions and biota;
4. Ecological descriptions and species lists of similar intact ecosystems;
5. Herbarium and museum specimens;
6. Historical accounts and oral histories by persons familiar with the project site prior to damage;
7. Paleoecological evidence, e.g. fossil pollen, charcoal, tree ring history, rodent middens.

The value of the reference increases with the amount of information it contains, but every inventory is compromised by limitations of time and funding. Minimally, a baseline ecological inventory describes the salient attributes of the abiotic environment and important aspects of biodiversity such

as species composition and community structure. In addition, it identifies the normal periodic stress events that maintain ecosystem integrity. Descriptions of the reference for cultural ecosystems should identify the cultural practices that are critical in restoring and later in managing that ecosystem. The description of a reference is complicated by two factors that should be reconciled to assure its quality and usefulness. First, a reference site is normally selected for its well-developed expression of biodiversity, whereas a site in the process of restoration typically exhibits an earlier ecological stage. In such a case, the reference requires interpolation back to a prior developmental phase for purposes of both project planning and evaluation. The need for interpretation diminishes where the developmental stage at the restoration project site is sufficiently advanced for direct comparison with the reference. Second, where the goal of restoration is a natural ecosystem, nearly all available references will have suffered some adverse human-mediated impacts that should not be emulated. Therefore, the reference may require interpretation to remove these sources of artifice. For these reasons, the preparation of the description of the reference requires experience and sophisticated ecological judgment. Written restoration project goals are critical for determining the detail that is needed in the description of the reference. For large landscape-scale restoration for which only general goals are prescribed, the description of the reference can be equally general. In such instances, aerial photographs may represent the most important source of information for the preparation of the reference. Restoration at a finer scale may require much more detailed reference information, such as data that are collected at site in small plots.

Rehabilitating the Urban Poor

The last but not the least concern is the rehabilitation programme for the inhabitants of the dwellings along the Beliaghata canal, as mentioned earlier in this note. According to a recently conducted survey, 22% of Indian urban population lives in slums as against 32% for the whole world population; most, if not all of these people earn under the urban poverty line. Data from a study by National Institute of Urban Affairs (NIUA) reported that among the poorest cities were Kolkata (89% below the poverty line), Bangalore (73%) and Indore (68%). More disturbingly, there was a gender divide in the distribution of urban poor in the slums: NIUA reported that 68% of this group consisted of women. Also notable is the fact that 6 million of this population is in the age group 0-6.

From a mainstream view, it can be said that slums "spoil" the look of the city.

Because slums breed poverty and high unemployment, there is a high crime rate stemming from these neighborhoods. Since these are illegal settlements on encroached public land, they do not pay the basic or civic utilities taxes expected from any legal settlements in a city. However to be fair, we should consider the prevalent conditions in these urban slums from another viewpoint that slums have inhuman and dangerous living conditions with a total lack of security and a fear of demolition at any point. They do not have basic civic services like waste collection and disposal, clean drinking water, properly maintained drainage system, electricity or paved roads. If we take the issue of equitable distribution of municipal water: even in cities claiming 100 percent coverage, the per capita availability varies 10 times between poor/slum and rich locations. It has been reported that nearly 50% of urban child mortality is the result of poor sanitation and lack of access to clean drinking water in the urban slums. Slum dwellers constantly live with the fear of losing their home (sometimes they invest thousands to build these) and their possessions to demolishers. Many settlements have been demolished again and again, even though they were built before 1995, which according to the government are legal houses. In spite of many of these people having proper documentation (ration cards, Vote ID cards) to prove their domicile legally, there has been no respite. In this whole rigmarole of demolitions and re-settlements, huge amounts of money pass hands as bribe to the police, goons and corporations. Also, these demolitions are not preceded by proper notices; India, as a signatory to UN Human Rights treaty is bound to follow certain procedure before any evictions. What leads to this booming increase in slum settlements in a city is rapid and uncontrolled urbanization which is intimately connected with migration from suburban and rural areas, think the unavailability of basic minimum wages and basic perks (like affordable housing schemes) for these people.

Evictions and demolitions have been seen by the state as one of the major solutions to the “problems” of slums. The rights of slum dweller to shelter, basic amenities, etc. have also been marginally and occasionally addressed. There has been no consistent or unified Government policy through the 50's till the 90's except for a policy of brute force demolition. However, the realization dawned slowly that demolition and re-settlement is not the answer. Resettlement in most cases proceeded erratically and was dependent on the whims and fancies of local municipal officials and the affected poor were completely excluded from any decision-making. This led to the Slum Improvement Program in the 70's to improve the basic amenities like drainage, drinking water, roads, toilets etc. However, the 80's again saw another spate of demolitions in Mumbai; on a positive note, the Supreme court ruled that eviction of the petitioners (slum dwellers) will lead to

deprivation of their livelihood and consequently to the deprivation of their life and violates Article 21.

The Slum Upgrading Programme (SUP) funded by the World Bank in 1985 covered only 22,000 households and was terminated in 1994. The Slum Redevelopment Scheme (1991) provided some new incentives for private developers and builders to redevelop slums– such as the ability to transfer development rights to other areas of the city. The theory was that by selling the extra space in the open market, tenements for slum dwellers would be cross-subsidized and made affordable to them. However, this was a big non-starter due to the existing skepticism of the slum dwellers for developer/builders, given their history of forcible evictions in the past; on the other hand, the builders themselves did not think this to be a good business opportunity nor did they anticipate a good return on their investment. 1995 saw the Slum Rehabilitation Scheme in Navi Mumbai, that actually enriched Mumbai's powerful construction lobby by robbing both public assets and the urban poor (S.S. Tinaikar Committee, 2001). In 2001, the Government and NGOs formulated the slum resettlement plan for 60,000 people. The Draft National Slum Policy of 2001 initiated a newer level of understanding of the issue of urban slums-that slums are an integral part of urban areas and contribute significantly to their economy both through their labor market contributions and informal production activities, rather than looking at slums as "problem areas". Thus rehabilitation programme must address the issues that have already sparked societal and economic disparity and trouble.

Suggestive Guidelines

Taking these aspects into consideration a mandate can be suggested for the comprehensive and inclusive restoration of the Beliaghata canal and a roadmap to that extent can be prepared. The suggestive guidelines are discussed as hereunder.

- **Ecological Restoration of the Canal :** Considering the Environmental Impact Assessment report as a decision support tool, restoration of canal ecology needs to be planned. The essential components of waterways restoration would include:

  (i) Increase the flow volume of water in the canal so that the biological oxygen demand is reduced. This will prevent eutrophication and enrich biodiversity in the aquatic environment.

  (ii) Stagnation of water has to be removed at war footing that helps breed obnoxious diseases and germs. In this regard dredging of the canal is recommended rather than sporadically treating the stagnant puddles with germicides, oil or insecticides.

  (iii) Embankment stabilization is essential to prevent siltation and contour shrinkage. However, concretization of the embankment is strongly negated as this will damage the ecological integrity of the stream ecology.

  (iv) Bioengineering with vetiver plantation and cultivation of lemon grass is a much preferred option for embankment stabilization. This can increase carbon

sequestration rate and act as an alternative livelihood opportunity for the urban poor. The aesthetic beauty of landscaping with vetiver and proper plantation programme along the embankment will be a value addition.

(v) Stringent norms for Integrated Solid Waste management (ISWM) are essential for saving the canal from choking owing to garbage dumping. All biodegradable and non biodegradable solid wastes are to be cleaned and prohibited for disposal in the canal water.

(vi) Non point pollution sources, open defecation and point polluting sources should be diverted and treated before drainage. Close monitoring of water quality is suggested.

(vii) Silt trap needs to be installed to distill the silt carried through river water from the open end of the canal meeting river Hoogly during high tide inflow.

- **Rehabilitation of dwellers along canal bank :** Detailed assessment and sociometric analysis of the six clusters revealed in the survey extol on the decision of immediate rehabilitation and socioeconomic rejuvenation of the dwellers. Perusal of data clearly indicates certain critical thresholds in relation to disease proliferation and baking of social abuses that are still in manageable dimensions. Attitude scoring analysis pertaining to rehabilitation and social inclusion shows a conditional intention in resettlement that depends on the poverty alleviating factors and betterment of lifestyle. In keeping a view of these facts and figures a set of recommendations are forwarded herewith for designing a comprehensive rehabilitation plan for the dwellers of canal banks.

  (i) The members in the dwellings along Beliaghata canal needs to have a proper awareness campaign and participatory vulnerability analysis workshop to make them understand the essentiality of getting resettled with socio economic betterment. The prescribed rehabilitation program has to have a phased out program with compensatory rehabilitation plan ensuring social inclusion.

  (ii) In the said phase wise rehab program the basic amenities in the existing situation like sanitation, drinking water and per capita space is to be prioritized on the top. Parallel to this a systemic reclamation of these basic facilities also need to be done in the existing situation for those who would be rehabilitated at the later phase.

  (iii) A thorough medical screening for STD and other contagious diseases is recommended as prevention against disease proliferation.

  (iv) In every possible way open defecation in the area has to be stopped immediately for which additional sanitation facilities are required to be erected in the locality. In this regard, dry toilets are recommended as a cost effective solution.

  (v) Perusal of survey reports have hinted about brooding and escalating social abuses like drug peddling and flesh trade that are of serious concern. General awareness drive, community reactivation and follow up measures for preventing these to cross the threshold mark is suggested as a preventive measure.

(vi) Integrated solid waste management should be put to place for substituting open dumping, sorting and exposure to solid garbage for abetment of pollution and health hazard.

(vii) In certain areas (especially cluster VI) where are settlements are already recognized by KMDA and common facilities and municipal services have been assured-there may be a legal divide of opinion and practical feasibility issue in regard to resettlement of the inhabitants. Contingency plans for conflict resolution is highly advised.

(viii) Overall, the rehabilitation program doesn't seem to face stringent opposition from the inhabitants of the locality unless vested political interests over run the situation. The target subjects have preparedness for rehabilitation which is though conditional, that can be modified as a positive output through social advocacy, capacity building and awareness campaign.

(ix) It is suggested that the inhabitants may be included in a participatory model for restoration activities to be undertaken about the canal. This can lead to a win win situation for the needful.

The intention of our study was to edify our audience consisting of policy decision makers and administrators about the inconceivable living conditions in these slums along the Beliaghata canal. Currently, the living conditions in the slums are abominable; therefore, neonatal death is increasing at a rapid rate. All generations are experiencing malnutrition and the slum-dwelling population has increased over the decades. We would like to illustrate to our esteemed readers how the slum-dwellers have been impacted, how the education system is not giving children the precious gift of learning they all deserve, the necessary support they need from their parents but do not receive, and the basic facilities to live a healthy life or live at all. With our presented information, we want to instill our concerns in policy level decision making system about those who are born to die in unsanitary and then to be known as an Indian.

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