Health and Housing

Some Factors for Ensuring Positive Physical Health for the Poor

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The process of analysis of shelter situation in the vast country of India reveals a number of problems; lack of awareness about hygienic living conditions being the most important of them. Inadequate and contaminated supply of water coupled with poor sanitation results in diseases and reduced economic opportunity, especially for the urban poor. A case for ensuring positive health for them, through provision of simple methods of procuring water and dispensing waste may thus be achieved by rainwater management techniques and decentralised sanitation systems. With particular reference to an urban poor settlement in Kolkata (the third largest urban agglomeration in India) a proposal for change and improvement is put forward that seeks not only to alleviate poor health conditions but the decadence of poverty as well. Through regular meetings with community, awareness campaign and model project as well as with stakeholder participation this paper shows the process in which the proposal may be translated into short term and long term action plans. The ultimate goal of this exercise is to empower the poor in making healthy housing for themselves.

Shelter Situation Analysis

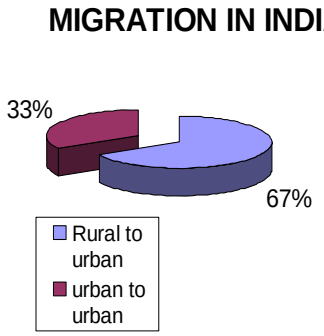
Basic General Data

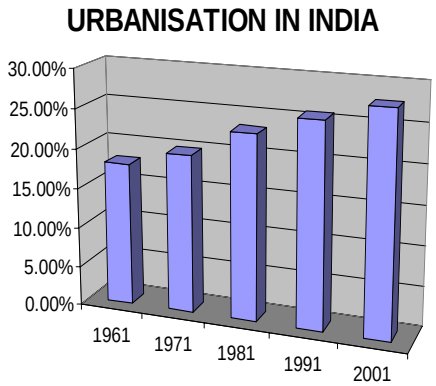
India is the **seventh-largest** country in the world by geographical area and the **second most populous** (1,028,610,328 according to last census). Modern India is a large and complex country that defies easy characterization. On the one hand, it is now the **fourth largest economy (PPP)** in the world and one of the fastest growing economies. On the other hand, despite these gains, India battles endemic poverty and uneven development with 25% of population below poverty line and **79.9% of its population living on less than $2 a day**.

West Bengal is a state in eastern India. With Bangladesh, which lies on its eastern border, the state forms the ethno-linguistic region of Bengal. An agriculture-dependent state, West Bengal occupies only 2.7% of the India's land area, though it supports over 7.8% of the population (80,176,197) and is the most densely populated state in India.

Kolkata (Calcutta) is the capital of the Indian state of West Bengal. It is located in eastern India on the east bank of the River Hooghly. The city has a population of almost 5 million, with an extended metropolitan population of over 14 million, making it the third-largest urban agglomeration and the fourth-largest city in India. Like other large cities, Kolkata continues to struggle with urbanisation problems like poverty, high migration levels and pollution.

Migration in India is much higher from rural to urban areas compared with urban to urban levels because as is known, economic opportunity is much greater in urban areas. Urbanisation has also kept pace, reaching almost 28% in 2001.





Shelter Related Fact and Figures

Access to Shelter

The total requirement of urban housing during the 10th Plan period (2002-2007) as per Planning Commission of India estimates works out to 22.44 million dwelling units including a backlog of 8.89 million dwellings. However the more important consideration is in terms of the material used for housing, as most of it is spontaneous and informal.

It may be noted that 71 % of roofs of houses are built with materials other than concrete, such as grass, thatch, bamboo, plastic sheet and tile whereas 55% of walls are built of mud, plastic, bamboo and stone.

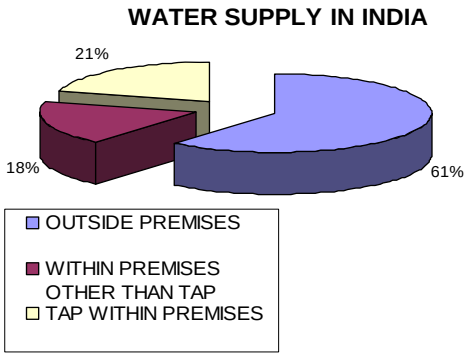
Building Materials Used in Housing

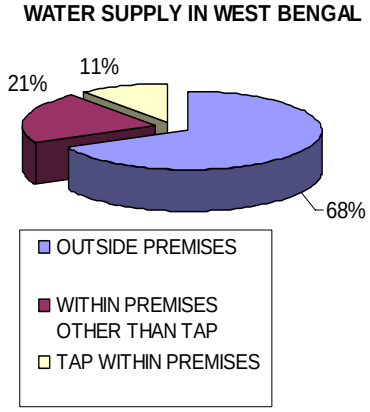
Total No. of census houses	Material of roof								
	Grass, Thatch, Bamboo, Wood, Mud etc.	Plastic, Polythene	Tiles	Slate	G.I., Metal, Asbestos sheets	Brick	Stone	Concrete	Any other material
249,095,869	53,386,004	1,173,771	75,526,970	2,808,660	30,487,215	14,074,492	17,153,862	52,839,227	1,645,668
	Material of wall								
	Grass, Thatch, Bamboo etc.	Plastic, Polythene	Mud, Sunburnt brick	Wood	G.I., Metal, Asbestos sheets	Burnt brick	Stone	Concrete	Any other material
249,095,869	24,737,121	721,776	73,799,162	3,196,992	1,998,678	111,891,629	25,481,817	6,540,338	728,356

Access to Infrastucture

Water

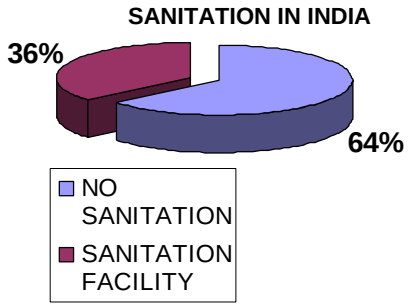
In India piped water supply within premises is only available to 21% of the population while another 18% have access to water through tubewell, well or pond. In West Bengal the figures are 11% and 21 % respectively.

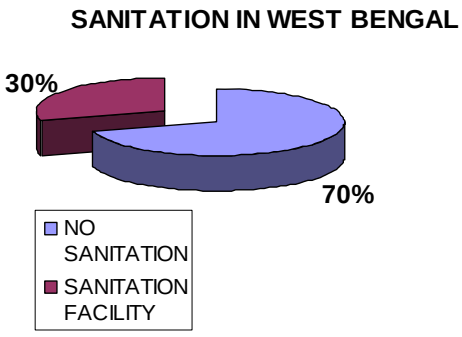




Sanitation

The situation in sanitation leaves much room for inclusion and improvement as is evident from the following pie charts.





Existing Housing Policy

The *National Urban Housing And Habitat Policy of India* 2005 would like to ensure that all dwelling units have easy accessibility to basic sanitation facilities and drinking water, while it recognises that there is a need to integrate policies regarding air and water pollution, solid waste disposal, use of solar energy, rain water harvesting, energy recovery from wastes and electricity supply in the planning process.

It also takes note of Government's special focus on shelter for all and development of related infrastructure with a particular reference to poor and promotion of economic development, quality of life and safe environment. It makes the state responsible to prepare the State Urban Housing & Habitat Policy, prepare long term programmes and short term strategies to tackle problems in housing and basic services and synergise the provision of adequate infrastructure facilities like water sources, connectivity, drainage, sewerage, sanitation, solid waste management and power supply.

Additionally, it encourages NGOs/CBOs and Partnership with Government Bodies in housing, micro finance and infrastructure activities. Most significantly it recognises that women and children are particularly affected by poor housing conditions and lack of clean water and proper sanitation.Better living conditions, improved community services and facilities will reduce the vulnerability of women and children to disease, diminish the burden of household tasks and provide more time for income-generating activities.

Identification of Critical Shelter Problem

The process of Shelter Situation Analysis and corresponding data obtained, reveal a number of problems; lack of awareness about hygienic living conditions being the most important of them. In India, the majority of population (approx 72%) live in rural area, where, despite enthusiastic campaign by the Central and State Government, the awareness level and access to hygienic living condition is still poor.

Supply of drinking water, disposal and treatment of waste and sewage, storage of water and food, design of shelter to receive maximum air and light and hygienic way of rearing children, still remain goals to be achieved for a large section of population in rural areas. Ironically on the other hand, by 2025, India's water

supply will be stressed i.e. it will be drawing 40% of its total supply without any possibility of replenishment.

The rapid migration towards urban areas, ironically, has made situations no better. A large number of people migrating to urban areas in search of jobs are compelled to live in slums or slum like conditions which offer no better hygienic conditions as far as shelter is concerned. The problems mentioned above remain a stark reality in a large part of urban areas populated by migrants from rural areas, either in or out of the slums.

From previous research on slum upgradation in the city of Kolkata (Calcutta) and as a member of an NGO that has gained useful experience in this area of activity, it is known that about one-third of Kolkata's population lives in 2011 registered and 3500 unregistered slums. Numerous people live in streets and earn their living as cheap laborers or beggars; nearly half of these pavement-dwellers are children. Supply of clean water and connection to piped sanitation at own premises is, as borne out by statistics, for the very few. Inadequate quantity of water for performance of daily activities results in three-fold problems. A disproportionate amount of time and effort are spent especially by women and children to collect water from distant sources, the quality of water thus collected is unknown and there never is enough to ensure a standard of cleanliness. Again, lack of sanitation leads to another set of problems. Disposal would be anywhere in the open contaminating water sources and triggering floods.

Most importantly, inadequate water supply and sanitation would lead to rampant spread of diseases which are indeed debilitating. In West Bengal alone, (of which Kolkata is a part) cases of diarrhoea in a single year was 720352 out of total of 8904597 in India and of hepatitis, 5831 out of 153034.

Thus the critical shelter problem may be aproached with the following goal;

A case for ensuring positive health for the urban poor, through provision of simple methods of procuring water and dispensing waste

Within the current framework, the afore-quoted problem will find its agenda in state policy and more adequately in local or municipal policy and thus needs to be addressed proportionately

As such, this project would be able to work further in this area of spreading awareness and help in implementing conditions in shelter leading to healthy living condition, with particular focus on Kolkata.

Analysis of Critical Shelter Problem

In Kolkata, the water supply authority (Kolkata Municipal Corporation or KMC) claims a rather high figure for per capita (202 litres) water supply per day at source. However this needs to be considered in view of three factors: about one third of the total population in Kolkata lives in slums or squatter colonies and has to collect water from stand posts only, another 20-25 per cent is served by single tap connections in their houses and at least 25-35 per cent of the water supplied, goes waste due to leakages in worn-out pipes, public taps and stand posts. Thus, the actual figure for use, in areas of non-piped water supply, is unlikely to go beyond 90 litres per day. This is a situation that is compensated for, by use of ground water through sinking of private tubewells.

According to the Central Ground Water Board of India (CGWB), due to large-scale withdrawal of groundwater from the confined aquifers (1123.70 MLD in 1998) and little inflow (only 204 MLD) a depression of piezometric surface in Central and South Central Kolkata has developed. In 2003, the withdrawal figure was about 2120.5 MLD with inflow being even less.

More alarming and cause for concern is the quality of water. A survey, conducted by the Federation of Consumers Association (FCA), West Bengal and Better Business Bureau, a NGO, found that 80 per cent of the 1,000 water samples collected from all municipal wards of the city contain *E.coli* (bacteria that indicates the presence of faecal matter), S*almonella* (responsible for typhoid), *Shigella* (bacteria that causes dysentery) and *Vibrio* (causes cholera).
(Source: *The Telegraph*, April 14, 2003)

Another recent study conducted by Better Business Bureau (BBB) concluded that the quality of water supplied by KMC is good at the source (where it is treated and pumped from), but gets contaminated on its way before it reaches the consumers. Major and minor tank leaks are endemic and bursting of major pipes is frequent. These factors are the principal causes of not only substantial loss of water in transit but also gross pollution and deterioration in water quality. The researchers examined 100 samples out of a total of 1000 samples collected from nine zones. The study revealed that 87 per cent of water reservoirs serving residential buildings had high traces of human waste and roughly one-fifth of the deep wells and hand pumps maintained by the Kolkata Municipal Corporation also had traces of excrement. Also in 2003, the civic authorities have had to seal many deep tubewells in the city after test reports from laboratories of the School

of Tropical Medicine, KMC and the Department of Public Health Engineers confirmed arsenic contamination beyond permissible limits. The concentration of arsenic was found to be four times higher than WHO prescribed benchmark.

Not surprisingly, the storm- and wastewater systems are in many ways totally insufficient. Infrastructure is either lacking or inadequate. As consequences, large parts of the city get flooded every year and untreated wastewater leads to eutrophication and clogging of the recipient. In certain areas there is even a back-flow from the River Hooghly to the streets. Parts of the city have an under dimensioned sewer system, other parts lack connections between buildings and existing sewers, and parts of the city totally lack actual sewers but have an open system. With the exception of East Calcutta Wetlands and a minor waste water treatment plant (WWTP), wastewater is discharged into the recipient without any treatment. An ADB (Asian Development Bank) development plan for Kolkata aims to construct new sewer systems where lacking, connect buildings to already existing sewers, and new WWTPs are planned or under construction. However even with these WWTPs included, most wastewater will remain untreated. The problems with drainage of Kolkata are further aggravated by extensive siltation and collapses of the wastewater mains. Sewer capacity is lost by as much as 40 – 50%, and the untreated wastewater has a riverbed rising to critical levels for the city drainage. The wastewater pipes also leak, which results in drinking water contamination in areas where water pipes lie adjacent to wastewater pipes, especially if the former also are leaky or has low pressure. This is especially valid for standpipes. Areas not covered by piped sewage and areas with under-dimensioned capacity constitute a health hazard for its residents, especially during heavy rains when major flooding occurs. Flooding normally results in polluted drinking water with spreading of diseases, such as cholera, as a consequence. Following a cholera outbreak after a major flood in 2000, it was only through extensive chlorination of all water supplies that spread of the disease could be controlled.

In order to realise the practical manifestations, reasons and extent of this problem and to analyse the role of stakeholders, it becomes necessary to identify groups of urban poor for further study. Identification could be completely arbitrary or at random. However, in anticipation of weaknesses, it is thought best to approach those groups, members of whom are known to the researcher.

Accordingly, two settlements have been identified, visited, observed and residents interviewed in order to establish the extent to which the problem affects.

Settlement 1 is over thirty years old, situated along railway tracks at Lake Gardens, South Kolkata. Lake Gardens is a typically mixed-use but mostly residential area of lower middle and middle income families. The land inhabited by this Settlement in Lake Gardens is illegally occupied and whereas some of this land belongs to Indian Railways, some are privately owned. Indian Railways has in the past year evicted two –thirds of the settlement from their land, leaving about 570 houses, approximately. They have provided alternative land to the evicted population at about 8 km from present location. It is therefore understood that this Settlement faces threat of complete relocation to new site

Settlement 2 is truly old - of over one hundred and fifty years at Ananda Palli, Rajarhat, North 24 Parganas, West Bengal, India (North- eastern reach of Kolkata urban agglomeration).Rajarhat is an upcoming planned new town adjacent to Salt Lake, another fully developed upper middle class township. There are about a 1000 houses (approx.) and all are legal owners of land. Sizes of plots vary from 100 - 140 sq.m. although a few are larger (670 Sq.m.) Most households have between 4 to5 members and the principal breadwinner is in most cases male and employed as chauffeurs, and unskilled/ skilled labourers in nearby construction projects. The greater part of the population comes under the low-income category, with only a few below poverty line and other few in lower-middle income group.*

The source of water here is tubewell at own premises (picture on right), whose depth (aquifer) is about 21- 24m. Additionally, about 4, which are common, (depth of aquifer 75m) are provided and maintained by KMC. These are mostly used for collection of drinking water. Quantity of water is not enough, available only for one or two hours in the morning from personal tubewells. In many houses old wells had to be abandoned because of low yields and new ones dug. Approximately 50 - 60 litres are collected and stored in buckets. However, in monsoon yields are better and need for storage decreases.

Position of tubewell and septic tank – 1
(Tubewell on left; Septic Tank on right)

Collection of water from KMC tubewell

The maximum approach distance of KMC well from house is 100m (approx.) and minimum is 20m. Water is mostly collected by women and children (picture on left). However there is no knowledge about water quality – only, it is boiled for children as a precautionary measure.

The cost of water is only that of sinking tubewell which is Rs. 4000.00 (US $ 93) approximately.

Toilets are also at own premise, essentially pit latrines with manual cleaning systems. Depth of pits is typically 4.5 – 6m at distances of 2- 5m from tubewell *(As in picture showing position of tubewell and septic tank 1).*

Position of tubewell and septic tank - 2

Only a few premises have septic tanks situated 9 to 10m away from buildings *(Picture on right).* There is yet no knowledge of grey water usage or eco-sanitation amongst residents.

There are regular instances of diarrhoea especially in monsoon,
as also amoebiosis throughout the year.

Thus, from the interviews it is obvious that:

Settlement 1 is spontaneous, characteristically unauthorized, transient to the extent of threatened existence, uninformed about issues addressed, not yet water stressed whereas

Settlement 2 is mostly spontaneous, legal, permanent, somewhat informed about issues addressed, already water stressed and affected in health. Distances and depths of tube wells vis-à-vis toilet pits are truly alarming. Many residents are interested in using rain-water although the concept of eco-sanitation has not yet found favour with them. Both settlements suffer from lack of suitable quality of

water as also frequent outbreaks of water- borne diseases. Water is mostly always collected by women or children even though there a large number of unemployed men are around the settlement for a greater part of the day.

We can therefore say that the problem as quoted before is affecting the urban poor in particular and the environment in general. The actors who can influence on the problem are the residents themselves with the help of NGOs (such as the one the researcher belongs to) who can in turn speak with and involve local Governments and national Governments. Lack of knowledge in methods of environmental sanitation and subsequent piece- meal ways of achieving it has resulted in the present condition ill-health in both settlements.

Since the question of tenure or suitable alternative accommodation completely occupies residents of Settlement 1, issues as addressed by the researcher is found to be secondary and may only be of importance at a later date.

Proposal for Change and Improvement

Although problems over water plagues all habitation, urbanized areas especially those of the poor, are particularly vulnerable due to reasons as seen in Analysis of Critical Shelter Problem. Modern systems of water supply and waste treatment in the city are already stretched beyond limits to serve the burgeoning population and the poor areas are more often than not outside this purview. At the same time rainwater runs off most urban areas (poor included!) in large volumes, either to be wastefully whisked away by a planned sewer network or allowed to morph into a flood situation.

This results in a rather paradoxical situation when so much water is unutilised yet depletion of ground water resources leads to manifold problems. In the last few years there has been a change in thinking among urban designers and drainage practitioners, and the technical language is in transition. This change has seen the single function view of traditional '**stormwater management**' give way to the integrated and comprehensive perspective that is captured by the term '**rainwater management**'. Stormwater suggests there is a problem, whereas rainwater is a resource. Thus, using rain water as a component of rain water management to avert the urban water crisis may be termed as **rainwater harvesting.**

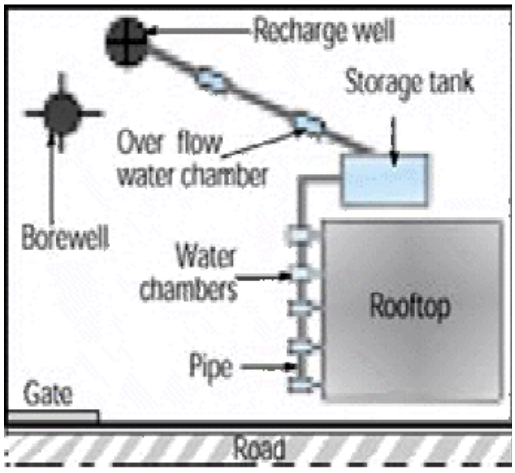
The proposal for change and improvement thus intends to utilise the concept of rainwater management to deal with the problems as identified. As sanitation and drainage are intimately linked with this concept, suggestions will also be made in

this regard, but will not be dealt with in any detail within the purview of this paper.

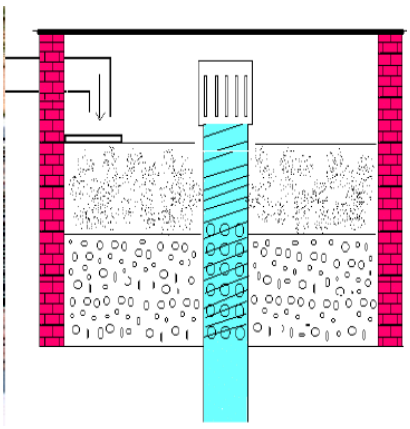
The quantity of rain available from an average annual figure of 1500mm may be calculated as **Water harvesting potential** (WHP) = Average annual Rainfall (mm) x Area of catchment x Runoff coefficient where Runoff coefficient depends on the porosity of surface(Roof Catchments : 0.80 –0.90, Paved areas : 0.60 – 0.80 Untreated ground catchments : 0.20-0.30)

For the city of Kolkata this is about 130.64litres/capita/day - a princely figure compared to many large cities in India. For the small individual plots of 100 sq. m. in Settlement 2, built up area is about 45 sq.m. So WHP is 80 lpcd out of a total requirement of 150 lpcd (as recommended by Indian standards for large cities) which is more than present total availability of 50-60l. The quality of rainwater already tested shows that Bacterial content is very low and most wonderfully decreases with time when stored properly. Ph value in most cases was nearly 7, indicating neutrality.

The components of a rainwater system as shown in diagram are as follows:-



Catchment (Rooftop and any other near horizontal surface)
Pipes or conduits
First flush devices with water chamber (to flush out initial dirt)
Filter system with storage tank
Storage tank
Recharge well



Schematic diagram of recharge well

Rainwater can be stored in tanks of various shapes, sizes and material according to suitability of location. This allows temporal availability at own premises thereby saving waiting time and labour of the most vulnerable groups, i.e. women and children. Size of storage tank can be arrived at in many ways e.g. collection for dry days, daily/ annual requirement, or storage for peak diurnal rainfall. It may be considered that excess rainfall on any particular day can be effectively diverted for recharge through abandoned tubewell, thus minimising wastage of water. Also this would recharge aquifers for future use on dry days.

The cost of RWH system depends on size and material of tank, length of pipes from collection point to tank and type of filter. Taking length of pipes to be not more than 20m. (according to area of typical house) and size of (PVC) tank 500 litres, the cost comes to Rs. 4700 (US$ 110) approximately. This compares favourably to the cost of sinking tubewell which is anyway, an unpredictable and dwindling source.

Thus we can understand that RWH has certain direct and indirect advantages. It is a free source, and can be easily collected, cleaned, used, stored and/or recharged in houses of any shape or material. Whereas with Kolkata's rainfall pattern it is possible to meet most of the demand without heavy storage options, in places of low rainfall storage tanks can be effectively designed for round the year usage. It also ensures zero run-off sites contributing to irrigation without need of any more fresh water.

Rain water is free from contamination, being separated from all polluting agents and sources, wastes no time for collection and is independent of the city network which may not spread to pockets of urban poor anyway. Rainwater thus harvested saves valuable time for women children and men whose efforts may then be directed towards effective capacity building for earning opportunity. Positive health also means continued attendance of work, greater working power and fewer expenses in treating diseases. Both these factors should contribute towards alleviation of poverty in meaningful ways.

Systems of sanitation that, as previously mentioned, are intimately linked with rainwater management, will be now touched upon in brief. Decentralised sanitation solutions have included the septic tank or more commonly the pit latrine. Both tend to pollute ground water to unusable levels. At the other extreme, underground sewerage systems with proper treatment facilities are difficult to provide,expensive, energy consuming and are in constant need of extension. In such a scenario one emerging solution is a dry composting toilet °. A composting

toilet collects human waste and converts it to a fertilizer resource for plant growth without polluting water bodies or groundwater. A composting toilet system (Eco-san separating pan) looks as shown in pictures below.

Tin drum for faeces and barrel for urine collection

This ecological method of sanitation consumes less than a litre of water per day for a family, converts human waste to a fertilizer resource, is clean, hygienic and functional and can be constructed almost anywhere

Although there is cultural resistance to eco-sanitation, elsewhere and in this settlement there are a number of factors in favour of the concept and residents may be constantly exposed to these, as has been done in Hull Street Development at. Kimberley, South Africa by the Sol Plaatje Housing Corporation. These factors are reduction in cost, little requirement of water, no scope for contaminaton and spread of disease, no dependence on elusive city network and extensive use for urban agriculture.

Another decentralised sanitation system of small investment and healthy returns is the Root Bed Treatment System which has essentially a bed of uniformly graded sand or gravel with plants such as reeds (Phragmites karka) growing on it. As RBTS utilizes simple natural processes, it is effective, yet inexpensive and simple to operate. However, the RBTS is suitable as a community based system because it takes up space and can treat large amounts of waste water at one time. Since the socio- economic aspects of this system has not been explored this may be considered in future and not immediately.
This will also be independent of network, clean with zero runoff and in fact contributing to irrigation without need of any more fresh water.

Based on facts brought out form general study, interviews and observation it is understood the proposal for change may be implemented through educating and

creating awareness amongst the poor in Kolkata, beginning with the settlement under study. This may be approached in the following ways:-

- An awareness campaign will be designed
- Regular meetings will be held with community of pilot site
- School children will be exposed to awareness programmes
- A model RWH system will be constructed with local labour and material

The **awareness campaign** will make use of aforementioned information as delineated, such as the threat of inadequate water affects all (Kolkata's impending water problems with facts and figures) potential of rainwater to meet increasing demand, comparison between quality of underground water and rain water, explaining effect of particular pollutants and contamination and prevalence of disease due to proximity of underground water source and septic tank/pit latrine and eco –sanitation as a way of tackling it.

Regular meetings with community will focus on ways of introducing RWH techniques and eco-sanitation in house design and optimizing their cost.

The awareness programmes that school children will be exposed to, will include importance of safe water, conserving water and rain water harvesting.

Rain barrel – A simple system

Construction of the model RWH system shall be preceded by discussion with community (three of them already conducted) which will define location, size and technicalities of the system as well as possibilities of using their (local) labour and sourcing material from nearby markets. Actual construction of pilot RWH system using 'Rain barrel' with participation of local labour will also be supervised and lessons learnt.

The campaign, programmes and meetings will utilize the presentation of Posters, Banners, Handouts and Video film.

SWOT Analysis

The Strengths of the proposal are ability to result in healthy community/city despite spontaneous self-help housing attempts, ability to encourage participatory processes, ability to encourage awareness of simple technical methods, ability to,

in part, realise MDG 7, target 10 and 11, ability to uplift condition of women and children as they are especially vulnerable and ensure **sustainability of the project through easy maintenance and** replicability of process.

The Weaknesses are difficulty in convincing concerned people and receiving feedback, difficulty in achieving balance between technicality and applicability and difficulty in ensuring affordable cost of initial investment

Opportunities already obvious are the scope of disease- reduced existence, scope of access to enough water of good quality at own premises, at all times, scope of environment and climate friendly options in house design, the scope of being independent of city water supply and sewer networks even in spontaneous settlements built of any material and the scope of using interesting trends e.g.: RWH, RBTS and eco-san. Also it is in line with India's Housing Policy that seeks to synergise the provision of adequate infrastructure facilities, encourage NGOs/CBOs in housing, micro finance and infrastructure activities. Most significantly the Policy recognises the proposal's notion that women and children are particularly affected by poor housing conditions and lack of clean water

The Threats that this campaign faces are indifference of residents, lack of finance for campaign, researchers' lack of knowledge in networking with other settlements of urban poor and lack of powerful instrument to elevate campaign to mission, in order to reach local and state governments.

After having recognised the threats and weaknesses of the proposal the work of stakeholders in similar situations have been studied and many have been contacted for advice and guidance or funding as the case may be.

These organizations[1] are :-

Japan Water Forum (JWF)- An application had been made from Centre for Built Environment to Japan Water Forum, Tokyo, Japan requesting grant for activities as listed for campaign.

A grant of US$ 1000 has been promised by JWF to the project or activity which was named as **Bhoroshar Borosha (Promising Rain)** and the water issues described were**,** acute water shortage due to falling ground water tables, prevalence of water borne diseases, taking away of productive time from men, women and especially children and ignorance about rain water harvesting techniques.

[1] Activities of all organisations quoted are explained later under 'Introduction to Organizations' in References section.

Centre for Science and Environment (CSE), New Delhi, India who recommended that the researcher contact an organization, experienced in working with slum dwellers in Chennai, India. An extremely favourable response has been received in that this organisation has not only shared information but their personnel are also willing to come to Kolkata at their own cost in order to share experiences and impart guidance.

The Ramakrishna Mission (RKM), Kolkata, India has also been approached and has given verbal assurance to take up the activities of dissemination, publicity and interacting both with state and district governments , once a complete project report is prepared.

Action Plan

Short Term

Activities as promised to JWF, will be executed in the months of January to March 2007 as their grant is expected to reach by December 2006.

The activities that will be done at Settlement 2 will be regular awareness campaigns that comprise meetings at the settlement, where interactive sessions will be held with residents to popularize techniques before and after installation of sample system, designing, printing and putting up of banners in the neighbourhood, designing, printing and distribution of handouts to residents, making of video film and visits to schools to educate children on safe water and its conservation.

Construction of sample water supply system with use of rainwater will then be started with local labour and material. The system will consist of Gutter and pipe collection system, Filtration medium, Storage tanks with tap and elevated platform

Documentation and writing of report for Japan Water Forum entitled “What was successfully done and how it was done with JWF Fund” will be the next activity to be completed by 31st of March, 2007.

Also during the construction, personnel from Chennai will be invited to come to Kolkata in January 2007 for guidance regarding implementation of project in urban poor settlement.

The Centre for Science and Environment has been contacted and this project report will be published in their website during April to June 2007. This will contribute in a huge way towards popularizing RWH techniques in urban poor settlements of various cities of India, through the aid of NGOs and local governments.

Long Term

Although the awareness campaign for RWH techniques will successfully include techniques of eco-sanitation and RBTS , as yet there is no possibility of funding for pilot project. However, once the short term goals are on their way to being met (in the months of April - May 2007), it may be possible to apply for funding to ADB, UN Habitat or Water Aid. These organizations have assisted in operational research on 'Decentralized Wastewater Management and its Dissemination' in developing countries.

The Ramakrishna Mission will be approached in April - May 2007 with complete Project Report so that they may be convinced about RWH and eco sanitation techniques. With their experience in execution of sanitation projects in West Bengal (See References for details) it may not be too difficult to convince them into taking up cudgels for eco-sanitation and RBTS techniques. Also if residents are able to accept one interesting trend hitherto unknown to them, chances are that they will be motivated to try out another especially when they have so much to gain and so little to lose. Thus RKM may become a powerful instrument to elevate this campaign to a mission, in order to reach local, state and national governments.

The ultimate goal remains to educate the poor so that they are empowered to demand and/or self construct houses that would make them independent (or near independent) of city networks, for healthy living and consumption of basic services.

Annex: Questionnaire

QUESTIONNAIRE

GENERAL

1. Resident of how many years
2. Type of ownership of land now and history
3. Area of land
4. No. of people in HH
5. Occupation of main breadwinner

WATER SUPPLY

QUANTITY & AVAILABILITY

1. Source of water, nos
2. History & authority (control & manitenance)
3. Population served
4. Availabilty in hrs per day
5. Distance
6. Means of storage
7. Enough
8. Knowledge of rainwater usage and benefits

QUALITY

9. Awareness
10. Test quality of water or ph ,arsenic
11. Means of quality improvement

COST

12. Cost
13. Future posibility of priced water

SANITATION

14. Type, nos.
15. Population served
16. Distance
17. History & authority (control & manitenance with frequency)
18. Grey water usage & double pit latrines

BUILDING MATERIALS & DESIGN

19. Knowledge of building materials suitable for climate
20. Design of structure suitable for climate, i.e. light and ventilation
21. Importance of light and ventilation
22. Structural stability

HEALTH

23. Prevalence of diseases (esp waterborne)
24. How far is the hospital that is visited

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Home page of *Rainwater club*

Home page of *Centre for Science & Environment (CSE)*

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Introduction to Organisations

The Rainwater Club is an organization in Bangalore, India comprising a group of architects and engineers in who deal extensively with rainwater harvesting, ecological sanitation and grey water treatment systems. It has been disseminating information on rainwater harvesting and is run by S.Vishwanath, a water activist of international repute. The club has given technical assistance for RWH in slums of Bangalore.

Japan Water Forum (JWF)1 is a non-profit organization with international perspective. JWF was set up through cooperation of all stakeholders, including NGOs, Governments, Private sector and Academia in Japan for the purpose of solving water problems in the world. The Forum had invited grass-roots organizations in developing countries to apply for Japan Water Forum Fund 2006. This Fund is created for awarding grants to grass-roots organizations in developing countries involved in water-related activities.

The Ramakrishna Mission is a development-oriented religious organization established in 1897, with its headquarters at the outskirts of Calcutta, heavily involved in social development and rehabilitation works in India and abroad. The Medinipur District (in West Bengal) rural sanitation project, also known as the Intensive Sanitation Project (ISP), involved a partnership among UNICEF, state and district governments in West Bengal, the Ramakrishna Mission and voluntary grassroots community organizations The project had a three-tier organizational structure, with the Ramakrishna Mission interacting both with state and district governments at the top and
also with cluster organizations, voluntary youth clubs, and beneficiaries at the community level. In 1990, barely anyone in the villages of West Bengal's Medinipur District had household latrines, but just a decade later, as a result of this programme roughly 80 percent of the families in Medinipur possess latrines – reducing exposure to communicable diseases of excretal origin.

Centre for Science & Environment in New Delhi, India is an independent, public interest organisation which aims to increase public awareness on science, technology, environment and development. They have pioneered the cause of rain water harvesting through education, execution and advice.