

## IMPROVEMENT OF SLUMS BY ADOPTING A LOW COST HOUSING SYSTEM UNDER RELAXED BUILDING BYE LAWS.

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*Slums, typically occurring near the fringes of urban cities exist in an abject dereliction of the most basic standards of civil habitation, sanitation and health. Slum dwellers are compelled to eke out a subsistence from inhuman conditions of living and as a result, slums are not only infested with diseases, but in absence of civil regulations they also turn into ghettos of crime, human trafficking and drug abuse. In this paper, the authors attempt to suggest a relaxed set of building bye laws for a practical implementation towards better housing as a step towards a solution to this socio-legal issue. Estimation and costing of a model low cost housing system is also presented in compliance with the suggested bye-laws. Special consideration is made towards economy and social acceptability so that the suggested model is attractive to the intended beneficiaries as well as amenable to be adopted by the government and NGOs.*

**Keywords:** *slums, building bye laws, innovation, sanitation and health, low cost housing, social emancipation*

### Introduction

Narrow alleys circling huts with plastic roofs, open drainages jammed with poly bags and heaps of stinking mud, piles of garbage accumulating in corners and dark passages. This is not the plot of any Hollywood movie depicting life after the end of the world but is the truth in which a large chunk of the population is struggling. Slums are the realities we are ashamed of. Slums are Habitations located on disputed as well as unused government, municipal and private land and characterized by a serious lack of basic amenities and sanitation with dense and overcrowded housing conditions. Slums, typically occurring near the fringes of urban cities exist in an abject dereliction of the most basic standards of civil habitation, sanitation and health. Urban well off scorn at their sight, shudder and wish these souvenirs of rapid industrial growth disappear from the face of their otherwise beautiful cities but to their dismay, it does not happen. In India, Dharavi Asia's biggest slum spans over 1.75 square kilometres and

includes an estimated 600,000 to 1million dwellers. It is said that 55% of the population of Mumbai lives in slums, which cover around only 6% of the city's land. Slum dwellers are compelled to eke out a subsistence from inhuman conditions of living and as a result, slums are not only infested with diseases but in the absence of civil regulations, they also turn into ghettos of crime, human trafficking and drug abuse. These deeply engraved pictures of shantytowns in our minds is the result of what we notice from air-conditioned cabinets of our cars but a slum goes much beyond that. The bitter pill which we have to swallow is that without these slums, the machinery of the urban lands will break down miserably. These slums support the small industries by supplying labour ad semi-finished goods without which the middle and large scale industries will suffer a massive blow. If we gaze back in history, we will find that the existence of a slum goes long back in time. It is something universal. In early 19th century, when the present superpowers were not so powerful, they witnessed the migration of people from small towns to urban cities sniffing employment opportunities and better access to basic amenities. This led to the emergence of poorly built and overcrowded housing facilities. But unlike India, These countries took timely steps and introduced legislations to build low-income housing facilities with minimum standards. The scenario is fast changing to the good of the dwellers as well for the city. Slum development in India is the new wave which is sweeping the down trodden areas and converting them into habitable and hygienic living spaces. Providing basic infrastructure, sanitation, education, lighting, and community spaces are the top priorities in the minds of the change makers, Polymer technology can greatly contribute to achieving these goals to improve the condition of the slum dwellers.

Through this paper, we attempt to suggest a relaxed set of building bye-laws for a practical implementation towards better housing as a step towards a solution to this socio-legal issue. Building bye-laws are tools used to regulate coverage, height, building bulk, and architectural design and construction aspects of building so as to achieve orderly development of an area. They are mandatory in nature and serve to protect building against fire, earthquake, noise and other hazards. In India, there are still many small and medium sized towns which do not have building bye-laws and in the absence of any regulatory mechanism, such towns are confronted with excessive coverage, encroachment and haphazard development resulting in chaotic conditions,

inconvenience for the users and disregard for building aesthetics etc.

#### **ROLE OF SCIENCE:-**

Other than infrastructural problems, the people in slum suffer from lack of clean water and they lack electricity.

- In order to improve the life of poor people in Slums a plan to improve water conditions by using Solar Water purifiers which are cost effective and can be provided to the poor people by the government.
- There is a lot of waste near slum areas as the slum areas are normally near garbage sites. We propose that these waste garbage items be used to create electricity that can be provided. This waste to energy conversion can be highly useful and provide electricity.

#### **SOLAR WATER PURIFIER:-**

Many levels of purification can be achieved with this process, depending upon the intended application. Sterilized water for medical uses requires a different process than that used to make drinking water. Purification of water in heavy in dissolved salts differs from the purification of water that has been dirtied by other chemicals or suspended solids. Distillation is one of many processes available for water purification, and sunlight is one of the several forms of heat energy that can be used to power that process. Sunlight has the advantage of zero fuel cost but it requires more space (for its collection) and generally more costly equipment. To dispel a common belief, it is not necessary to boil water to distill it. Simply elevating its temperature, short of 6.6 boiling will adequately increase the evaporation rate. In fact, although vigorous boiling hastens the distillation process it also can force unwanted residue into the distillate, defeating purification. Furthermore, to boil water with sunlight requires more costly apparatus than is needed to distill it a little more slowly without boiling. Many levels of purification can be achieved with this process, depending upon the intended application. Sterilized water for medical uses requires a different process than that used to make drinking water. Purification of water heavy in dissolved salts differs from the purification of water that has been dirtied by other chemicals or suspended solids. Solar distillation systems can be small or large. They are designed either to serve the needs of a single family, producing from ½ to 3 gallons of drinking water a day on the average or to

produce much greater amounts for an entire neighbourhood or village. In some parts of the world, the scarcity of fresh water is partially overcome by covering shallow salt water basins with glass in greenhouse-like structures. These solar energy distilling plants are relatively inexpensive, low-technology systems, especially useful where the need for small plants exists. There are four possible ways of purifying water for drinking purpose. Distillation Solar distillation systems can be small or large. They are designed either to serve the needs of a single family or to produce much greater amounts for an entire neighbourhood or village. In some parts of the world, the scarcity of fresh water is partially overcome by covering shallow salt water basins with glass in a greenhouse like structures. These solar energy distilling plants are relatively inexpensive, low-technology systems, especially useful where the need of small plants exists.

There are four possible ways of purifying water for drinking purpose.

1. Distillation
2. Filtration
3. Chemical Treatment
4. Irradiative Treatment

#### **DESIGN:-**

We need to reduce the working pressure inside the distiller to increase the rate of evaporation at the lower temperature and hence increase efficiency. One more additional feature in the distiller that we are proposing is that it would use the latent heat which is released during condensation to heat up the water at lower temperature. This is achieved by using an innovative staged still design.

#### **USE OF RCC SLABS FOR ROOFING PURPOSE:-**

Houses in slums are made from a variety of materials ranging from plastics, poly bags to concrete. However, nowadays a transition from the 'kutchra' makeshift homes to the permanent concrete houses has been prominently made in a majority of slums. But the existing roof in such houses is that of AC Sheets over the brick walls which is of no drastic help either. During the rainy season, AC sheets' roofing gets damaged which thus results in water leakage and dampening of the walls. Furthermore, the drainage system in between the tenements ordinarily doesn't function properly and thereby causes frequent choking of drains due to steep slopes. A pertinent solution to this problem could be the use of Reinforced Cement Concrete (RCC) slab roofing.

To enhance the load carrying capacity of concrete, it is reinforced with steel bars of different diameters provided in an appropriate manner. Such concrete is called Reinforced Concrete and the rebars are called the reinforcement. These rebars are provided at various locations in the required number and diameters to resist the internal forces, which are developed due to the loads acting on the structure. The brick tiles being porous and moreover laid on mud and mud-plaster duly grouted with cement sand mortar do not gain too much heat in summer and thermo-action is negligible, therefore, cracks do not occur the joint of break tiles. When there is continuous rain, the water penetrates in the roof through the hair cracks in the joint and dampness will appear under the roof slab. Slab under the bed of stone slabs and tiles in terrace floors and floors of bathrooms etc. The rich concrete without proper reinforcement is prone to cracks due to thermo-action. Some professionals suggest the laying off 'Kuba' i.e. brick-bats grouted with sand mortar on the R.C.C. Slab which is also not suitable.

Low-Cost Housing is a new concept which deals with effective budgeting and uses environmentally friendly materials which are a substitute for conventional building components like use R.C.C. Door, floor and window frames in place of wooden frames.

Generally, the stone/tiles laying contractors and masons mix the cement sand mortar with water minimum for half day work, when the ordinary Portland cement mortar begins to set after 30 minutes and completely set after 600 minutes. When the setting of cement mortar starts, the unused cement sand mortar will start to lose strength gradually.

The waterproofing systems are conveniently made up of unit modules, which are permuted and combined to build various Systems depending on required service and conditions. The 'Solution' system approach and uncompromised quality of Products deliver fool proof reliable performance.

It is not out of mention here that even the stone flooring of toilets & kitchen washbasin give dampness in walls due to leakage through the joints of the junction because their back surface is not made water/damp proof. Similar is the case of the stone cladding of outer walls during the rains. It happens because the stone has no cohesive property being of plain surface and gaining more heat being homogeneous. In outer walls, it sometimes disintegrate during summer and causes fatal accidents Waterproof coating system goes deep into providing classy performance along with minimum disturbance,

waste and pollutants to the occupants and surroundings. The range covers right from New RCC Roof Waterproofing up to Load-free Waterproofing on old porous Lime-terrace. Even in standalone cement modifier range, the Products stands out in quality by technical advantages like sub-zero-to, non-migrating plasticizer & core-shell molecular structure.

Normally, thick R.C.C. slabs are used for roofing of residential buildings by adopting rationally designed constructions practices like filler slab and precast elements the construction cost of roofing can be reduced by about 20 to 25%.

Now in low-cost housing, building material cost is less because we make use of the locally available materials and also the labour cost can be reduced by properly making the time schedule of our work. Cost of reduction is achieved by selection of more efficient material or by an improved design.

#### **AREAS FROM WHERE COST CAN BE REDUCED ARE:**

1. Use locally available material in an innovative form like soil cement blocks in place of burnt brick.
2. Use energy efficiency materials which consumes less energy like concrete block in place of burnt brick.
3. Use environmentally friendly materials which are substitute for conventional building components like use R.C.C door and window frames.
4. Pre-plan every component of a house and rationalize the design procedure for reducing the size of the component in the building
5. By planning each and every component of a house the wastage of materials due took in place of burnt brick.
6. Use environmentally friendly materials which are substitute for conventional building components like use R.C.C door and window frames.
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14. By planning each and every component of a house the wastage of materials due took in place of burnt brick.
15. Use environmentally friendly materials which are substitute for conventional building components like use R.C.C door and window frames.
16. Pre-plan every component of a house and rationalize the design procedure for reducing the size of the component in the building.
17. By planning each and every component of a house the wastage of materials due to demolition of the unplanned component of the house can be avoided.

#### PEEPOO BAGS:-

Across all large slum dwellings in India what one finds common is the persistent stench that arises from guttural waste. Poor sanitation in slums has always been on an issue and the open drains invite a host of diseases like diarrhoea, cholera and become breeding sites for mosquitoes.

Also, a major headache for those who live in slums is a shortage of water. Despite all the promises made by successive governments water shortage remains an unsolved problem at large and the problem is aggravated by the fact that migrant rural population is going to need more of this already scarce resource.

The hand to mouth existence in slums leaves basic hygiene practises unattended. According to a very recent report in *'The Hindu'* "**Half of India's homes have cell phones but not toilets**".

#### MAKESHIFT TOILETS

The PeePoo bag serves as an alternative to open toilets. Construction from bio plastics ensures that environmental leakage does not occur. An inside lining of urea crystals decomposes poop into ammonia and carbonate using enzymes naturally present in faces. This raises the pH of the poop and subsequently kills most pathogens within a few weeks.

It is *environmentally Friendly and Useful for Agriculture* Better yet, the PeePoo bag does not cause additional environmental problems of its own and is actually practical for large-scale. Third World implementation. The bag itself is biodegradable and currently constructed from 45% recycled materials. Once the hygienization process is complete, the leftover ammonia can be put to use as fertilizer.

It is important that the PeePoo bag technology be employed. This simple technology will cater for the extreme situation by moving away from hard structures into a soft approach to sanitation and excreta management giving the individual inhabitant a choice to hygienic and sustainable personal sanitation.

#### EVALUATION:-

The proposed technology will be a universal remedy for prevailing human waste disposal facing slum residents. Remarkably, slim, the Peepoo bag, essentially a bio plastic bag containing urea powder, sanitises human excreta shortly after defecation. It requires no water, as after use the bag breaks down and disintegrates and the treated faeces become fertiliser with a high market value. It does not need any supporting structure, but, for convenience, a small bucket can help a lot.

1. This option is affordable and will improve the quality of life with minimal lobbying and negotiation with the residents. There will be need for awareness campaigns and sensitization on the use of the bags and the organic manure.
2. The organic manure utilization component relates to income generation and is expected to develop into a cottage industry, which will attract a significant proportion that will derive direct benefits from the initiative and build a sustainable micro-enterprise.
3. These technologies will not involve the construction of new infrastructure leading to the displacement of people, i.e. this proposed intervention will not touch on the existing settled areas.

**PORTABLE TOILETS:-**

Sanitation is a major problem in city slums as there is not enough space to accommodate a normal toilet and also a lack of awareness in people. Therefore, it is quite necessary to have compact and clean sanitation solution: Portable toilets. It is made up of light-weight sheet plastic, such as polyethylene. In this model, we focus on providing the same to the city slums which are basically made from low weight polymers and also have the advantage of hygiene and easy cleaning.

Since safe disposal of plastic wastes, in particular, is one grave issue that needs to be paid heed to so we propose an efficient recycling of plastic wastes. For working on this front, rag pickers could be employed to perform the valuable work of collecting, sorting, and where possible selling for reuse or recycling, the remaining waste. Normally, rag pickers in such a situation are self-employed, and because of this it has often been hard for them to organise effectively to protect their rights. By giving them employee identity cards and encouraging them to organise into groups that they run themselves, they can be made to have a more stable and secure income.

**POLYMER FURNITURE:-**

With the growth of polymer industry and innovations in the field, furniture market has experienced a rapid growth with the availability of a new, cheap and better replacement for the conventional wood furniture- Plastic furniture. This type of furniture is commonly made from solid molded polyethylene marine grade polymer.

**ADVANTAGES:-**

1. Low cost material, Flame retardant, U.V. Resistant, outdoor durability.
2. Very strong, can be light or heavy depending upon need.
3. Economical and eco friendly

This type of furniture can be used in slums to develop local schools, and to provide cheap home furniture, one of the major advantages of this remains its flame retardant capabilities that prevents losses in case of common slum fires, and its UV resistance, that ensures its long life.

**POLYMER PAVEMENTS AND ROADS:-**

Slums especially in Delhi have a very poor connectivity to roads. These roads are either in accident prone condition or aren't very permanent in foundation. A poor road leads to difficulty in bringing Health and other

facilities in times of need to these areas, and often is the cause for poor sanitation, disease spread, etc.

Therefore proper long lasting pavements and roads can be constructed by using polymers.

Polymer stabilization, in most instances, minimizes the need for borrow-pit materials.

In-situ aggregates and other materials, normally discarded for road construction, can used with Soil Tech and Polymer technologies are immeasurably more carbon friendly than traditional layered , cement-stabilized roads. Independent reports have shown SoilTech polymers, from Polymer Pavements, produces a meagre 2.4% carbon in comparison to cement stabilized, layered roads. One kilometre f cement stabilized road, seven meters wide, will produce 50,449 tons of carbon into the air as opposed to 1,217 tons produced by our polymer stabilized road.

**ADVANTAGES:-**

1. Waste management: The junk plastic used here helps us to manage effectively and economically.
2. Environment Friendly: Carbon-di-oxide emissions during construction are 32 times less than the conventional roads.
3. Economically cheaper: than using Bitumen, used as a binding agent to hold together the base and the sub-layers of the road.
4. Cuts down on labour costs, water cots and construction time.
5. Long Life: doesn't crack under stress.

**POLYMER COMPOSITES AS CONSTRUCTION MATERIALS:-**

TITLE: Eco-Composites

Specifies

Overview of application-

Eco-composite is a term which is used to describe composite materials with environmental and ecological advantages over normal composite materials such as FRPs. The drive towards sustainable construction and environmental legislation such as the End of Life Vehicle Directive and Landfill Tax has resulted inconsiderable interest in the use of reclaimed waste such as plastic packaging for construction materials, as well as the use of natural plant fibres, wood, and bio-derived resins and adhesives. An eco-composite may contain natural fibbers such as hemp, sisal, jute or flax or consist of a natural polymer matrix derived from cashew nut shell liquid. Eco-composites can be produced from combinations of reclaimed waste such as wood, newspaper, and plastics.

Natural composites based on starch can be produced which have the important advantage of biodegradability. A composite which is easier to recycle such as an all polypropylene material may also be termed as an eco-composite.

**Financial:**

Eco-composite may be produced from cheap raw materials or waste.

**Environmental:**

1. Eco-composites may contain natural fibers or resins, reducing need for either petroleum derived plastics or glass fibers.
2. Eco-composites may be composed of waste material such as post-consumer plastic or newspaper.
3. Eco-composites may be made to be biodegradable or easier to recycle.

**Social:**

1. Some natural fibres and resins are obtained from the Developing World, improving trade with those countries.
2. Provides a potentials alternative crop for farmers.

**Engineering:**

1. Certain combinations of natural fiber are lighter than the alternative glass reinforcement, however generally the structural performance of the composite is lower which limits the applications. Plant fibers can be stiffer than glass, however tensile strength and impact resistance are lower.
2. Plant fibres also do not lend themselves too many of the advanced production processes of polymer composites such as pultrusion.

Future developments and estimated time-scale:

High interest in this area of research due to increased pressure for sustainable construction

These materials because of their low cost provide cheap and good alternatives to slum dwellers in parts of Delhi.

**POINT-OF-USE WATER PURIFICATION USING RECHARGEABLE POLYMER BEADS**

POU water purification can pare the cost of pure, safe water to meet the needs of the neediest. This breakthrough holds the promise of reducing the impact of water borne diseases throughout the developing world. The fundamental principles of the Halo Pure reversibly binds chlorine. There is a shift in attitudes on improving

safe water access. Chlorinated technology are deceptively simple to understand, although their incorporation into a reliably reproducible and practical medium for water sanitation has taken years of intense effort and research. Porous polystyrene beads are similar to those used for water softener resin beds, are modified chemically so as to be able to bind chlorine or bromine reversibly in its oxidative form. One way to think of this compound is as solid-state chloramines, biocide in its own right, by virtue of giving up their chlorine to microbes that come in contact with them. But, unlike chloramines in a swimming pool, these surfaces are quite capable of repetitively taking up chlorine and establishing a stable chlorine bond. All that is required is enough free chlorine to surround the binding site. Almost no free chlorine is released when the beads are placed into the water flow.

Organisms make contact with the display of chlorine, for example, on the surface of the beds, and pick up enough halogen to inactivate them in short order. Those not killed within seconds suffer a near-death experience, and succumb quickly in the product water as the adherent chlorine slowly damages the organism to the point of fatal consequences.

Interestingly, because the halogen attaches to the organism it can be stripped off as well. In case of bacterium, if the halogens is stripped off before it has killed the organism, the bacterium can recover.

**HARNESSING POWER AND ECONOMIC ADVANTAGES**

The economic advantages of this kind of medium are immediately apparent. All you need is to ensure availability of that source of "topping up power"- in the form of free chlorine- and the user can potentially have the continuous benefits of halogen based disinfection of drinking water but without having to wait for local authorities or international agencies to install and run purification plants, pumps, distribution system pipes, and so on.

And because the efficacy is not dependent on adding free chlorine to the water, many of the disadvantages normally associated with that approach are avoided entirely. The challenge, however, has been to find a means of embedding this elegant disinfecting medium into the core of a practical, easy-to-use device, designed for household use in developing countries

The very durability and unprecedented low operating costs of the halogen rechargeable medium raised the stakes even higher.

The elements of purification that needed to be assembled around the bead medium have to ensure that the microbiologically safe water also looks good, smells good, and tastes good- all qualities that are important to water consumers the world over, even those most deprived of reliable access to safe water.

The assembly of such purifier is relatively cheap while more sophisticated and multifaceted as compared to a regular purifier. Durability and easy recycling plays a vital role in cost reduction.

A breakthrough in POU purification the technology holds the promise of reducing the impact of water borne diseases throughout the developing world. Its widespread use could contribute to the realization of UN goals for access to safe water for all by 2015.

And it could do so without resort to the massive infrastructure investments that are needed to reach this goal using more conventional centralized sanitation and distribution approaches. Recent research has shown how powerful the effect on family and child health can be from the introduction of simple POU water purification measures, even when these are not accompanied by significant improvements in sewage disposal.

### Conclusion

We have reached to the heights of moon but the tragedy is that in some of the areas we are still in the loop holes. At the end of this paper author would recommend that the Traditional tools of framing the development plan proposals in respect of zoning be changed and a method of regulating development to achieve a specific urban form shall be provided. Development control rule shall be made such that maximum number of dwelling units can be accommodated in the available piece of land to optimize the use of land without affecting adversely the quality of urban life and to save agriculture land. More focus on environment and resources like urban water bodies forest and bio diversity be made so as to shape a city towards sustainable development. Different rules are framed for congested and non-congested areas within the jurisdiction of the municipal councils. Congested areas were developed 40 to 50 years back and are still deprived of essential amenities. While granting new building permission in congested areas rules and regulation of non-congested area should be made applicable. This is required for making the congested area into a non congested area in future, otherwise congested area shall remain congested ever and the people living in this area will be deprived of breeze, light, ventilation and smooth transportation on street etc.

Further there should be a commission or a body which see after the developments in slums which can be comprises of District magistrate (D.M), Municipal Corporation, PWD, and this committee or commission can be headed by town and country planning (Ministry of urban development).

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