

# Incremental Housing Development and its Implementation in India

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**Abstract** - India as a country is seeing rapid growth in the urban sector, with a growing number of housing projects. In spite of the sudden spurge, the satisfactory levels of housing for the citizens of this country are not met. Incremental housing, an approach where a home is not viewed as a finished product, but rather as a process in which inhabitants can participate in constructing their own home based on their wants and financial constraints is an unexplored concept in the country. India's Housing Policy has yet to include Incrementality as a concept. The paper aims to highlight the problems faced during the implementation of Incremental housing in India, using case studies of existing projects in India. Further the paper covers and studies prominent Incremental housing examples all over the world to further draw conclusions by coming up with different approaches that can be adopted for Incremental housing to be implemented in India.

**Index Terms**- Incremental Housing, Housing sector development, Housing Policy, Incrementality, Housing, Housing approaches

## 1 INTRODUCTION

Housing or shelter is the basic human need, according to the Universal Declaration of Human Rights in 1948, adequate housing is not merely a goal but a human right. Housing design and construction have become an indispensable part of all construction projects across the globe. "The booming populations, and an increase in the number of rural-to-city migration rates, have led to a decrease in the household size to meet the number of units." Despite the urban development in our country housing remains to be a problem in the major cities of the country. A problem that remains unsolved. "Deterioration and absence of primary necessities in most settlements in India are the major factors of the country's need for housing production in recent years." [1]

According to John F. C. Turner, user involvement from the procurement procedure till the finished product is associated to user satisfaction. When the user is not involved in the process of building a house, it is likely to result in dissatisfaction as the result may or may not meet the expectations of the purchaser. "Dwelling/housing as a design product will achieve prominent success when the potential users are involved in the design process" [2]. One solution to the housing problems faced in India is a simple concept, the concept of incremental housing. The incremental housing concept relates to a housing system that allows residents to build their own homes in the future. "By incremental development, I mean the step-by-step, resident-driven improvements and transformations of houses and, by extension, that of neighborhoods over an extended period, which is in accordance with their changing economic and social situation" [3]. Incremental Housing concept follows the norm of creating a skeleton and providing the most crucial rooms of the house like washroom, bedroom, kitchen. These rooms are the major elements of any housing unit, the rest of the house is left to be developed by the owner based on his/her economic or family needs. This paper aims to achieve

the following

- Defining Incremental housing
- Study of incremental housing examples in India and across the world
- Various approaches to incremental housing
- Recommendations for implementation of incremental housing in India

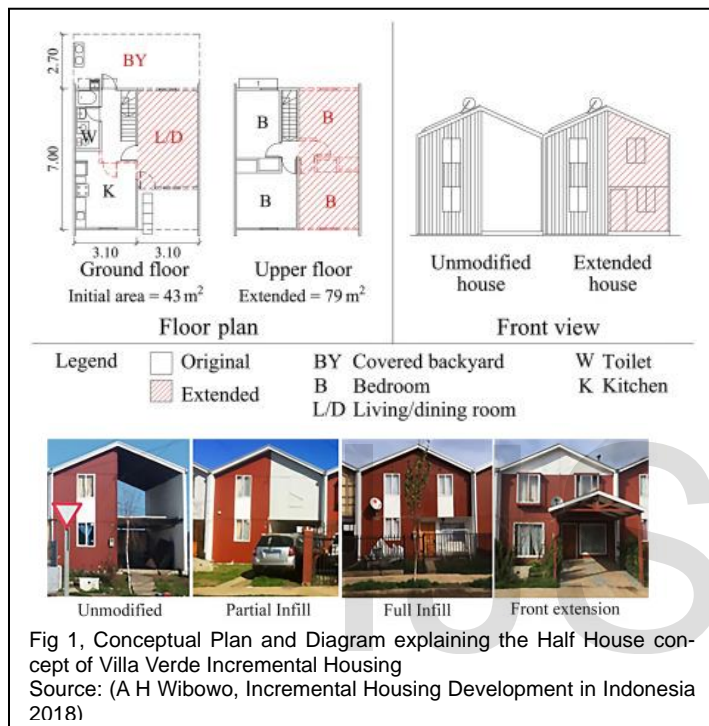
## 2 INCREMENTAL HOUSING CASE STUDIES

In this paper, incremental urbanism is viewed as an 'alternative' to current urban ideas as well as a viable style of urbanization from which modern Indian cities can benefit. In the last decade, multiple architects have adopted the concept of incremental housing; this concept is a viable solution for the mutual benefit of upcoming society and the government. This concept allows the user to develop their own house in the future. Examples of incremental housing are seen very prominently in Chile and various other countries. In this paper case studies of similar projects are studied and compared to further understand the importance of incremental housing.

### 2.1 Villa Verde Housing

Elemental owns Villa Verde, a housing project in collaboration with Arauco, a forestry firm. This company is made this project for a place to call home for their employees. The position is not in the heart of the city. Because they want the workers to be close to them, they chose a location that is close to the job. [9] The ownership of land in each unit appears to be more obvious in landed housing, which also results in a bigger built area. Here the architect follows the Half house concept, where one half of the house is constructed, the rest is left for the

owners to construct based on their needs. Up to two bedrooms and a family room can be added to the area available for extension. Villa Verde has a total of four bedrooms, as well as a dining room, a family room, and a patio for entertaining guests. The service area is supplied on one side to ease the pipe operations, and one staircase is provided for vertical access. As a result, when the time comes for the inhabitants to expand their home, they won't have to worry about staircase circulation.



## 2.2 Tila Housing

The Tila housing block consists of 39 apartments, all of which are constructed in a way that they all face south. On the north side, there is a single loaded corridor that is utilized for circulation. The inhabitants can create another mezzanine level with a 5-metre height of each storey and beams as the support system previously provided. Partition walls help with the infill method, the inhabitants are free to use whatever material they like to fill the interiors. This type of design establishes a boundary that prevents expansion from occurring outwards, but rather inwards. The architect constructed one bathroom for the 50sqm unit type and two bedrooms for the 102 sqm unit type, apart from the structural support. The supporting structure has allowed the residents to keep the outside of the apartment intact and changes are done on the inside. In contrast to the outgrowth design, which allows people to build their own facade, the entire facade is designed ahead of time. As a result, this design caters to the upper middle class section of the society. Architects, as support system providers, simply supply a vacant area that residents can create as an infill sys-

tem. This concept is inexpensive to construct and that occupants will be satisfied with their homes because they have the liberty to design their own interiors. Infill systems allow the user to place furniture in place as well as determine how much room is available on the unit and for which activity. For example, where should the bedroom, workspace, stairs, mezzanine, and family room is placed.



## 2.3 Quinta Monroy Housing

These modules will be able to accommodate up to five families and will be available in two styles. The following is an explanation of both units:

The dwelling type depicted in blue on the above illustration provides direct access from the front door. Only sideways and backward space expansion occurs. This type of structure allows residents to start a business in order to boost their local economy. Two types of housing units follow one designed module. The Duplex type are as shown in the images above shaded in orange, blue, and red. Since this kind is positioned directly above the housing type. Space expands not only sideways and backwards, but also upwards. As a result, each unit has its own set of stairs. Three types of dwelling units are included in one planned module.

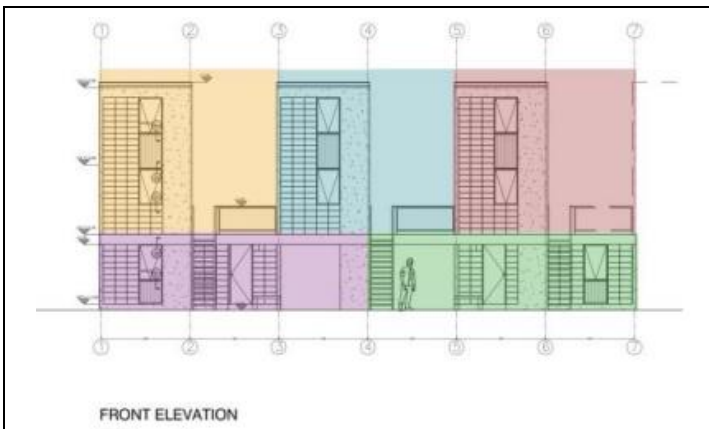


Fig 3, Elevation of Quinta Monroy Housing, showing the different apartments with different colors

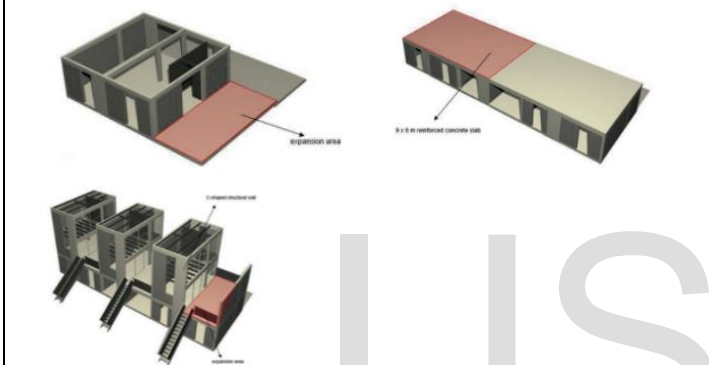


Fig 4, Incremental space in Quinta Monroy Housing  
Source: (A H Wibowo, Incremental Housing Development in Indonesia 2018)

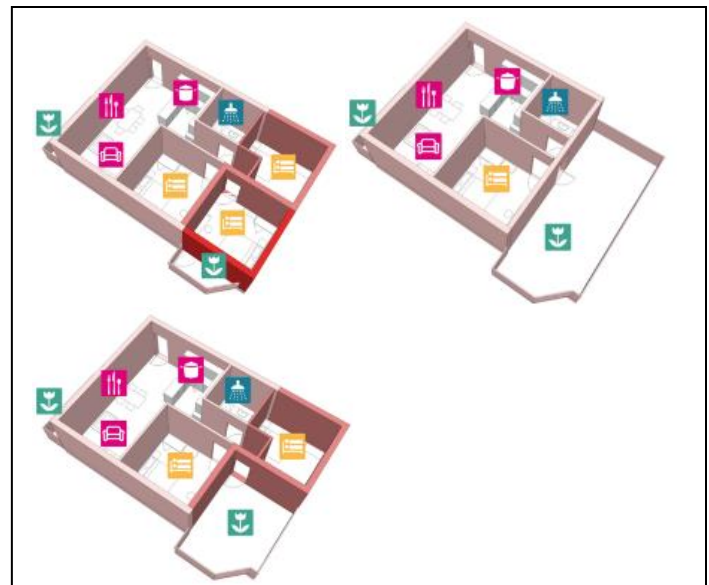


Fig 5, Isometric Diagrams showcasing use of Balcony as incremental space in Weston William Housing  
Source: (A H Wibowo, Incremental Housing Development in Indonesia 2018)

## 2.4 Weston Williamson Concept

The British Weston Williamson Studio uses the notion of progressive housing in vertical houses to address Palestine's housing need. Chilean architect Alejandro Aravena came up with the concept of an incremental house, where residents can expand space based on their financial resources. Each apartment will have a spacious balcony and will be built with cores in the middle. The residences are intended to be long-term homes that "grow with their occupants." Residents can use prefabricated panels to expand out onto balconies. Prefabricated panels can be arranged in a variety of ways to produce interesting shapes. There are a number of sizes and layouts available in this apartment, ranging from one to three bedrooms. The community room, on the other hand, is designed on the bottom floor. The expansion is limited to three rooms and can be done on the balcony, which was purposefully intended to be large enough.

## 2.5 Incremental housing in India: Yerwada Pune

In India, this is not a new concept and various attempts have been made to introduce incremental housing in the lives of citizens. One such example of incremental housing in India is the project commenced by Filipe Balestra and Sara Göransson in Mumbai, in collaboration with SPARC and Mahila Milan. The project involved communication and understanding the requirements of the people living there. Workshops were held to explain the concept of incrementality and to increase the involvement of people with the whole design process. Grants were given to families for the future development of their house. The project included three types of prototypes:

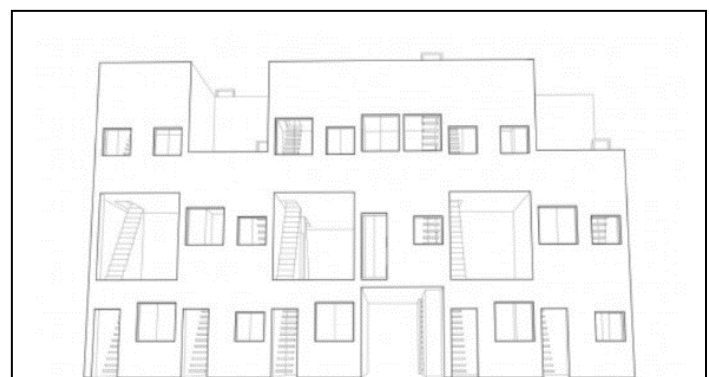


Fig 6, Yerwada Incremental Project  
Source: (Yerwada, Pune Incremental development, 2016)

The first Prototype allows the user to develop and extend the house vertically by adding another floor on top of the skeleton frame provided. Thus, allowing conversion from a two Storey house to a three Storey house. The second prototype involves providing a framework with the ground floor as the incremental space that can be utilized as parking or extended to build a shop or living area. Keeping in mind the daily activities of the people that are going to reside in these houses, the third prototype was made where the framework was provided and the middle space in the three Storey building was left for expansion. This space could be used as a balcony or be converted into a living space. It could also be used as a workshop space based on the user's needs and requirements. The Yedwada project focused on gradual development of buildings without demolition, reducing price with simple frame structure, letting users to take part in design process.

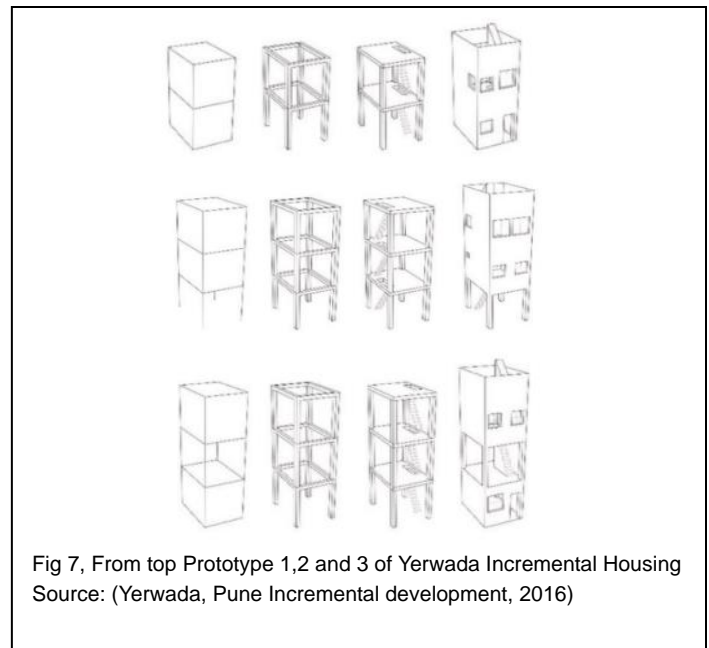


Fig 7, From top Prototype 1,2 and 3 of Yerdwada Incremental Housing  
 Source: (Yerdwada, Pune Incremental development, 2016)

### 3 COMPARISON BETWEEN THE CASE STUDIES

TABLE 1  
 COMPARISON BETWEEN CASE STUDIES

Case Study	Villa Verde	Tilla Housing	Quinta Monroy	Weston William-son	Yerdwada Project
<b>Location</b>	Chile	Finland	Chile	Palestine	Mumbai
<b>Type</b>	House - Half House	Loft	House and Duplex	Apartment	House and Duplex
<b>Core Area</b>	43.5 sqm	50 sqm	36 sqm	25 sqm	15sqm
<b>Expansion Area</b>	76.6 sqm	50 sqm	72 sqm	37.5 sqm	30sqm
<b>Main Function</b>	Dining Room, Kitchen, Toilet, Bedroom	Toilet and Common room	Toilet, Kitchen, Common Room	Toilet, Kitchen, Bedroom, Living Room	Toilet, Kitchen, Bedroom
<b>Additional Rooms</b>	Terrace, Bedroom, Living Room, Workspace	Dining Room, Bedroom, Kitchen, Workspace, Living Room	Bedroom, Dining Room, Study Room	Bedroom	Bedroom/Workspace / Garage/ Shop
<b>Floor to floor height</b>	2.48m	5m	2.34m	3m	2.48m

Based on the above case studies we conclude on some factors that should be considered while constructing incremental housing. First is Location the above table three out of the five projects selected are located in cities. It is because the incremental house intends for long-term habitation, and once the residents have decided on settling in a certain dwelling, they will not relocate. Furthermore, the presence of supporting facilities on site should be considered. Consider factors such as proximity to employment, educational institutions, health, and shopping, among others. In the above table, we also see how three of the five projects are low-rise residential. When designing incremental homes, it takes into account the

simplicity with which the community can participate and the simplicity with the users interact with their house and their surroundings. The core is the major part and a part of the initial construction process, in the above case studies we see how the expansion area is usually double the area of the core. We also see how toilet and kitchen are the two main function rooms that are provided along with the core in the initial construction process.



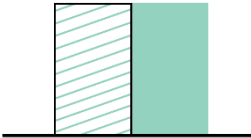


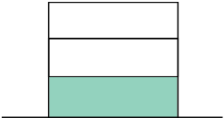
#### 4 APPROACHES TO INCREMENTAL HOUSING FOR IMPLEMENTATION IN INDIA


The community's participation in the construction process has shown to be quite beneficial in terms of community consolidation and cost reduction of housing units; however, it must be always done with technical assistance.[10] Incremental housing is an appropriate answer for these types of developments because it allows people to expand and enhance their units according to their demands and financial status while also lowering the initial financial investment. Delivering apartments with merely a sanitary block (kitchen and WC) and an

empty room has proven to be quite successful. After that, users can create the rest of their home and, eventually, add on to it.

Several distinct ways to unit expansion in incremental housing are seen based in the case studies provided in this study. Architects around the world have a different take on incremental housing and based on the solutions seen in the case studies a standardized building model can be created for incremental living. In the table below we see different approaches taken by the architects to expand the house and increase the habitable space.

TABLE 2  
APPROACHES TO EXTENTION OF INCRMENTAL HOUSING BASED ON CASE STUDIES

Case Study	Expansion system		Advantages	Disadvantages
<b>Outside India</b>				
<b>Quinta Monroy, Chile and Villa Verde</b>	Half House Extension Concept: Extension of House Horizontally		<ul style="list-style-type: none"> <li>- Less initial building cost Half the house is available for extension, more extension space</li> <li>- Easy to Expand</li> <li>- Provision of a medium size house at the cost of a small size house</li> </ul>	<ul style="list-style-type: none"> <li>- Requirement of extra area to be left during construction</li> <li>- Suitable for sites with large area available</li> <li>- Provision of all services will only be on the constructed part of the house</li> </ul>
<b>Tilla Housing Block Project</b>	Extension of Mezzanine		<ul style="list-style-type: none"> <li>- Safe structure</li> <li>- No need for extra space; utilization of vertical space</li> <li>- Easy to expand</li> </ul>	<ul style="list-style-type: none"> <li>- Investment in vertical communication</li> <li>- Could lead to ventilation problems</li> </ul>
<b>Western William</b>	Extension Along Balcony		<ul style="list-style-type: none"> <li>- Lower initial cost of construction</li> <li>- Secure investments for the owner.</li> <li>- Extension space can be used as a balcony if not used</li> </ul>	<ul style="list-style-type: none"> <li>- Requires technical assistance for expansion</li> <li>- Profile of the house will not be uniform</li> </ul>
<b>India</b>				
<b>Yerd-wada Project - Prototype 1</b>	Expansion on the ground floor		<ul style="list-style-type: none"> <li>- Lower Initial Cost</li> <li>- Use of space as a garage or can be expanded for commercial purpose</li> <li>- No need for extra space</li> <li>- Easy to expand</li> </ul>	<ul style="list-style-type: none"> <li>- Requires technical assistance</li> <li>- The main functions of the room will be constructed from the first floor onwards</li> </ul>

<p><b>Yerdwada Project Prototype 2</b></p>	<p>Expansion on the central/middle floor</p>		<ul style="list-style-type: none"> <li>- Use of space of work-space, balcony</li> <li>- No need for extra space</li> <li>- Easy to expand</li> <li>- No investment in vertical communication requires</li> </ul>	<ul style="list-style-type: none"> <li>- Extra expenditure for vertical communication</li> <li>- Security of the house is a question</li> </ul>
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**4.2 Inclusion of incremental housing in the national building policy as a solution to produce a mass number of houses:**

People of our country exhibit their ability to house themselves daily, even if they cannot afford to do so legally on the formal housing market. [8] Since independence, the Indian government has been committed to the development of the housing sector in order to provide housing to the homeless. It has focused particularly on meeting this critical basic need for the poorer sections, who cannot afford it or obtain it from the private sector or the market. Social housing schemes are one of the most visible initiatives of the national government, having been implemented since the country's First Five-Year Plan to satisfy the housing requirements of vulnerable people in both rural and urban locations.

Over the last few years, we have seen how the Indian government does not have the resources to build subsidized completed dwellings for all low-income households. Pradhan Mantri Awas Yojana (Urban) Mission launched in 2015 which intends to provide housing for all in urban areas by the year 2022. The mission launched has sanctioned 114.04 lakh houses out of which only 51.83 lakh houses are completed till date. The mission's end date isn't very far and the government has only reached half of its target. The project is suffering a serious financial setback as cash-strapped state governments have refused to release their share of funds. Government efforts to address these problems through the construction of subsidized completed dwellings for low-income groups are seriously limited by cost and management capacity. Conventional housing methods require a huge amount of money and labor and over the years even with the improvement in the construction equipment, the target number of units is still not achieved.

In Chile where 37,000 households were built per year initially through conventional methods, on including incremental housing to their national housing plan, the government was able to build 120,00 units per year. The initial cost of incremental housing is lower in comparison to the cost of construction through conventional methods. Further, the Self-build concept gives the residents of the house a feeling of ownership and pride. It also gives them the opportunity to venture beyond the strict lines of a typical house plan. The incremental change accommodates flexibility and effective use of available resources by actively involving the community in building its own habitat. [6]

The government of Sri Lanka and its 'Million Houses Pro-

gramme' achieved a tenfold increase in the number of low-income families recorded by switching from the 'supply approach' to the 'support approach' to their housing policy in 1980s. The support approach involves the government providing a basic framework of the house and the services, the rest of the house is left for the owner to construct and build. In many cases grants are provided to help families to expand their houses. Families that could not be given monetary grants are often compensated with sweat contribution, I.e., where the families are provided with construction material to further expand their house.

The Indian government must be persuaded that housing investment is a key reaction to urbanization that can contribute to national economic growth and poverty reduction. Housing policies centered on the construction of subsidized conventional residences in the formal sector have almost no effect on urban housing needs, which are satisfied by informal construction. By including the idea of incremental housing, a far greater number of units that are legal, secure, and healthy for the low-income groups can be achieved at a fraction of cost. Incremental housing proves to be a vital solution to not only meet the number of housing units produced but also to provide housing that meets the user's satisfaction. It is required to add additional programs to the existing public housing and urban development programmes and interventions to help incremental home builders. On one hand, the current housing stock's issues must be addressed first; and from the other hand, households and communities must be better equipped to identify housing options on their own. Incremental Housing development and it interfere in the various housing markets and design befitting governmental initiatives to aid incremental builders has enabled us by benefitting in two major ways one by allowing us to, expand the number of housing solutions and attain advance flow of services provided by the existing housing stock with nominal public investment. Some of the changes suggested are those that encourages private sector housing construction, while others are specifically designed to assist incremental construction and renovations. The table below compares public housing assistance programmes with and without incremental housing components for low-income households. Requirement to boost microcredit for housing, the focus on making local technical assistance programs with ample coverage and balance a greater work to improve the construction materials industry to better satisfy the needs of incremental builders are the major disparity between the two models.

TABLE 3  
 HOUSING PROBLEMS WITH INCREMENTAL HOUSING COMPONENTS

	Housing Programmes with incremental housing components	Housing Programmes without incremental housing components
<b>Land access</b>	Programmes for housing sector development <ul style="list-style-type: none"> <li>• Regulations on land use and subdivision are being reformed.</li> <li>• Initiatives to encourage low-cost residential land subdivisions</li> </ul>	Programmes incorporating incremental Housing <ul style="list-style-type: none"> <li>• Regulations on land use and subdivision are being reformed.</li> <li>• Initiatives to encourage low-cost residential land subdivisions</li> <li>• Encourage civil society organizations to help low-income families get access to land.</li> <li>• Legalize existing settlements</li> </ul>
<b>Financing</b>	<ul style="list-style-type: none"> <li>• Mortgage financing for new or used finished houses</li> <li>• Mortgage origination</li> <li>• Securitization</li> <li>• Re-discount facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Mortgage financing for new or used finished houses</li> <li>• Mortgage origination</li> <li>• Re-discount facilities</li> <li>• Securitization</li> <li>• Lending for residential land acquisition</li> <li>• Microcredit for housing</li> </ul>
<b>Building industry</b>	<ul style="list-style-type: none"> <li>• Improving the efficiency of the building materials industry</li> <li>• The real estate development industry's efficiency must be improved.</li> </ul>	<ul style="list-style-type: none"> <li>• Improving the efficiency of the building materials industry</li> <li>• The real estate development industry's efficiency must be improved.</li> <li>• Development of new construction materials, tools and pre-assembled components</li> <li>• Improvement of the construction</li> </ul>
<b>Public support</b>	<ul style="list-style-type: none"> <li>• Direct one-time assistance for low-income families buying new or used homes</li> <li>• Settlement upgrading programmes</li> </ul>	<ul style="list-style-type: none"> <li>• Direct one-time assistance for low-income families buying new or used homes</li> <li>• Settlement upgrading programmes</li> <li>• Support to incremental housing</li> <li>• Land + basic nucleus + microcredit + technical assistance</li> </ul>

#### 4.2 Use of incremental housing as a solution to legalize informal settlements:

Between 20 percent and 70 percent of the urban population in developing cities already produce their housing incrementally, most of them informally (illegally) with little or no security of tenure. If government strategies are not put in place to recognize and support this process, the world's urban slum population will more than double in the next 30 years – from 925 million to 2 billion [7].

In many cities, informal settlements houses more than half of the population. They are known for being adaptable, responsive, and cost-effective. Processes that allow families to expand their living quarters and make improvements to their homes over time at the same time their legal position is frequently uncertain now, and they are frequently underserved by urban infrastructure. They often seem to have unfit living conditions, and in some circumstances, are hazardous to one's health [8].

In a lot of cases, incremental housing is often confused with

encroachment, the expansion of houses on unauthorized land, or beyond the building bylaws. The incremental strategy can be seen as a steppingstone to tackle the issue of converting informal into formal without disturbing the social dynamics [6]. Informal housing in developing countries is often seen to include characteristics like insecure housing tenure, inadequate basic services, uncertain land authority, insufficient access to basic urban services, illegal and unsafe construction practices, and along with all these characteristics poverty and exclusion for society [11]. People living in such informal settlements can be provided with better and legalized houses to live in by using the incremental housing approach.

A Project in Iquique, Chile is an example of the private sector adopting the incremental housing initiative. Quinta Monroy was a 5,000m<sup>2</sup> site illegally occupied by 100 families in the center of Iquique, a city in the Chilean desert. A labyrinth of structures, the settlement was unsafe and difficult to police; however, residents were adamant – due to site's central loca-

tion—about remaining there. Elemental Architecture Group was tasked by the Chilean government to answer the following equation: “ To settle the 100 families of the Quinta Monroy, in the same 5,000 sqm site that they have illegally occupied for the last 30 years which is in the very center of Iquique, a city in the Chilean desert”. Architects were to work within the confines of the present Housing Policy, with a US\$ 7,500 subsidy to cover the costs of land, infrastructure, and design. In the current state of the Chilean construction sector, US\$ 7,500 buys only about 30 square meters of built space. The goal was to settle the families on the same site rather than relocating them to the outskirts. But the problem raised was to construct a house when the given money is enough for just half of the house. This led to the half house concept, where half of the house was constructed which included all necessary requirements like a bathroom, kitchen, and a bedroom, while the other half was left for future expansion.

By adopting a similar approach much informal housing across India can be converted into legalized communities, this process allows the government to provide a medium-size house at the cost of a small house at the same time, homeownership provides social security and status to its owners and occupants. Secure housing is the greatest financial asset available to most urban families. Better-quality dwellings have greater exchange values, more value as collateral for borrowing, and a higher price when sold [8]. At a fraction of the cost, incremental housing in slum up-gradation will give people and communities in existing informal settlements with the security of tenure, suitable infrastructure, and local management capacities.

#### 4.3 Use of Incremental Housing for redevelopment of disaster hit areas

India after Brussels and Belgium. is the worst-affected country in South Asia, according to the Centre for Research on the Epidemiology of Disasters (CRED), and it is also believed that in the last few decades disasters in India have increased 5 to 6 times [5].

Disasters can be either man-made or natural; natural including floods, droughts, cyclones, earthquakes, fires, landslides and man-made including communal rites, industrial disasters, epidemics, armed conflicts. Disaster Management consists of several phases which are necessary to consider when a disaster occurs. Most often the majority of organizations are involved in the first two phases that are relief and rehabilitation; preparedness, mitigation and reconstruction remain neglected. Post Disaster Reconstruction such phase of Disaster Management is a phase that allows new ways of organizing a community and minimizing vulnerability to hazards in the future. Building confidence, self-respect, self-esteem, self-dependency, mutual support, and mutual trust, as well as community reconstruction, are all part of the reconstruction process. Several principles and best practices in post-disaster reconstruction work have been identified based on ATMA Consultancy Services' reconstruction expertise, one such principle states “The reconstruction work should be community managed, controlled and owned, socially and culturally ac-

ceptable. It should promote mutual support of the communities, enlist self-help, and ensure voluntary labor.”[5]

“The incremental Housing approach is based upon the principle of increasing the responsibility of individual households and communities by encouraging decision making and responsibility of individual households or communities so that they take care of their aspects of housing for which they are in the best position to take” [13]. The concept of incremental housing promotes the involvement of the user with the house. Such projects give people ownership in their homes, foster community, and provide their most fundamental needs: safety, basic infrastructure and municipal services, and affordable land. It allows fast shelter response by constructing basic starter units that allow people to move in as soon as possible, and it reflects the technique by which these people frequently build, little by little, as time and money allow.

In 1976, an earthquake in Guatemala caused widespread devastation, similar to that seen in Haiti. It displaced 700,000 people (13 percent of the total population). The answer resulted in a site and services project, which served as a predecessor to incremental housing by constructing the basic core and then gradually developing and expanding it to satisfy people' priorities and needs.

In India Incremental housing is an ideal way to redeveloping housing in a post-disaster site; from the standpoint of the household since it does not expose them to danger, gives them economic flexibility, and allows them to fill out their units over time according to their preferences, needs, and economic status

## 5 CONCLUSION

As a nation with rapid population expansion, there is a severe housing crisis, and the community requires a prompt answer for housing construction. Mass dwelling with an industrialization system is a new solution on the horizon. Over the period of time, mass housing solution has their own set of problems number one being user dissatisfaction ; incremental housing fills the gap and provides an efficient solution for the mutual benefit of future society and the government. Incremental development is a constructive technique that allows for the construction, alteration, and dismantling of dwellings without causing disruption to others. On incorporating incremental housing in the above-mentioned strategies, India could potentially see a change in the housing sector with this approach, a home is not considered as a finished product, but as a process in which inhabitants can create their own home based on their wants and financial constraints.

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