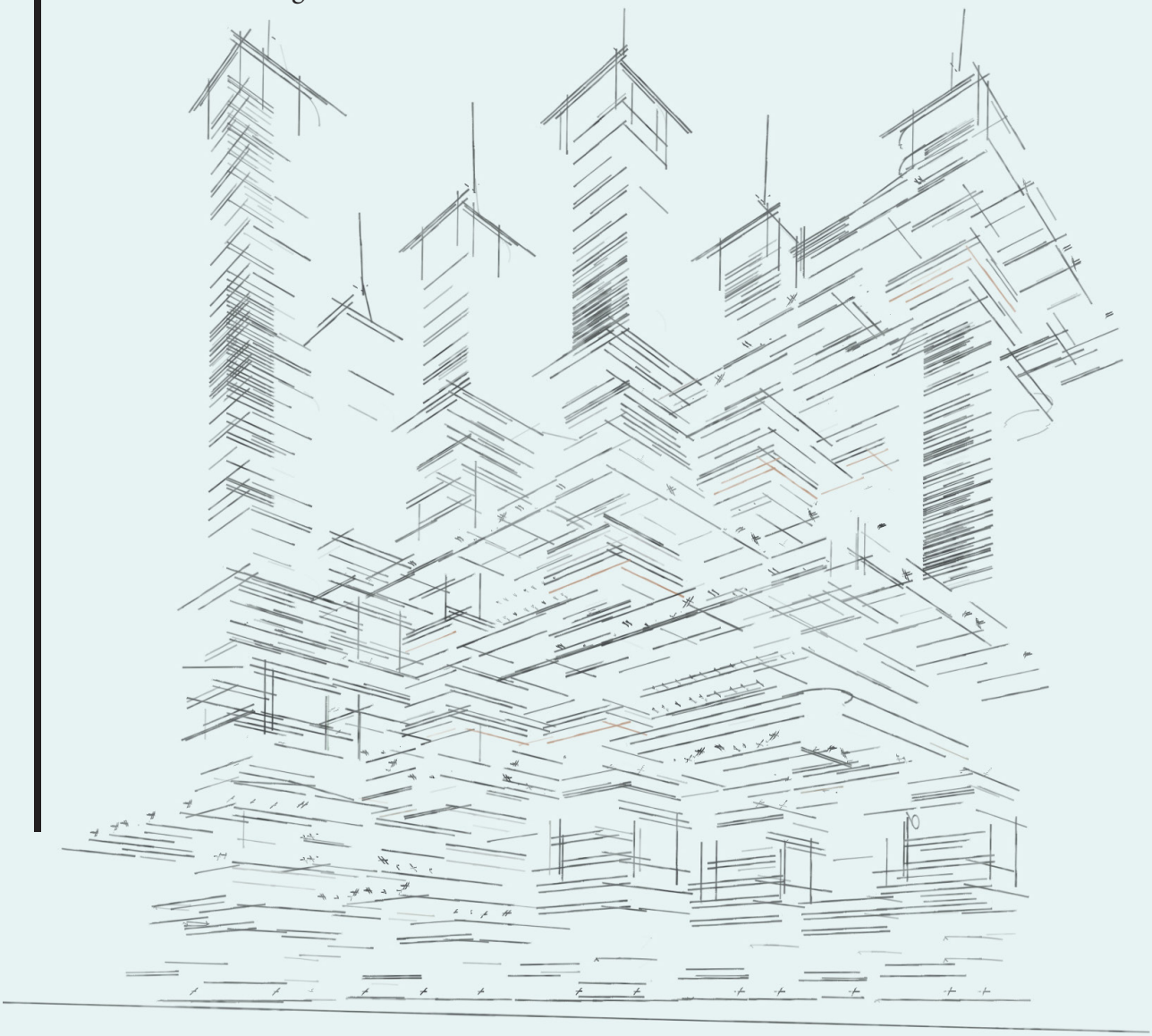
DESIGN BRIEF

THE PANORAMIC HABITAT

As subtle as a painting, as sleek as hair, overlooking the waters with an endless panoramic view, we have suspended the living units from tall towers that depict trees that spread out to give shelter to living creatures.



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INDIA

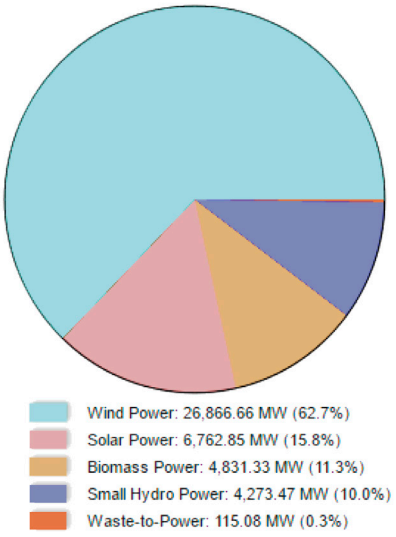
INTRODUCTION

Within the diverse terrain from Himalayas peaks to Indian Ocean, resides 1.252 billion people in an area of 3.287 million km². With her huge ***potential to harness renewable energy***, India was the first country in the world to set up a ministry of non-conventional energy resources, in early 1980s.

India's cumulative grid interactive or grid tied renewable energy capacity (excluding large hydro) has reached about ***42.85GW.***

Years ago the Indian subcontinent did not have air conditioners or electric heaters. Under traditional mud houses and thatch roof lived an entire family consisting of around 20 members sharing resources and tapping energy from their surroundings. Underground water recharge from rainwater through small pits and fans that turn with wind are not alien to us.

Since inception, the Indus valley civilization has been known for its well planned community living with its innovative vernacular techniques. '***Change is the only constant***' with the evolution of time, new techniques have been developed for comfortable living. But lack of shared spaces and use of non-degradable building materials post a serious threat. If this continues there would be a time when humans would be listed in the red data book and the ***last surviving humans*** would not know each other.



The attempt is to create spaces that would enhance people to communicate with each other, share their knowledge and experience, with this they begin to care for the space they live in. The design and features are such that it intervenes with the environment using ***green methods instilling a sense of responsibility*** towards the environment. This promotes collective growth and service.

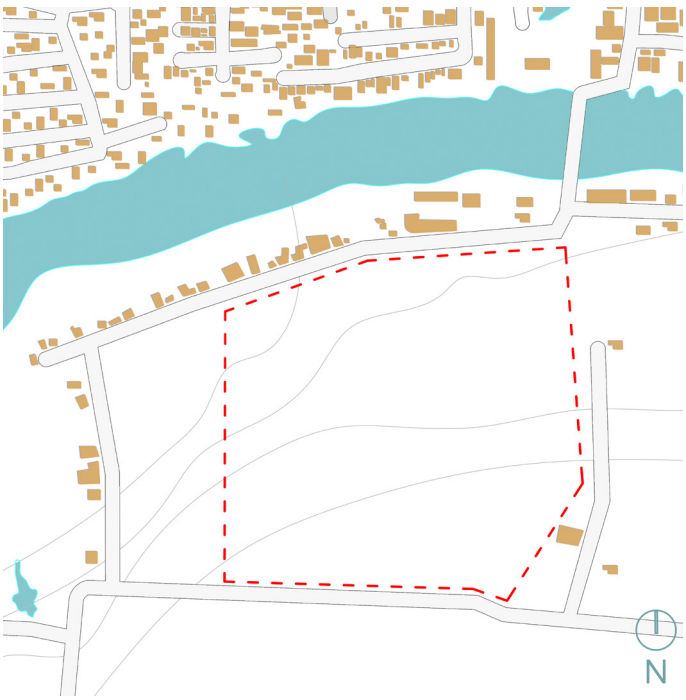
Education allows us to start from where our ancestors stopped, but somehow the growths in the recent years have taken a different route. The huge population outburst in India gave rise to huge concrete housing complexes. The recent Chennai floods due to cyclones reached its adverse state because of poor drainage pattern due to compact housing. Our attempt is to study from the past, understand the present and provide solutions for the future.

SITE

CHENNAI, INDIA

Coordinates	: 13.05 N 80.25 E
Average Elevation	: 16 meters (52.5 ft)
Area	: 40,000 SQM
Topography	: Flat Terrain
Vegetation	: Moderately dense, Mostly sparse
Micro Climate	:

As the rear end of site faces the ***Adyar River*** and the sea it will experience maritime climate with continuous land and sea breeze.



VISION

An advanced city is not a place where the poor can move about in cars, rather it's where even the rich use public transportation.

LONG TERM VISION

Through sustainable practices we intend to ***reduce the carbon footprint and global warming*** and also instil a sense of responsibility and commitment of social life in people by encouraging them to talk, discuss and grow together sharing spaces.

SHORT TERM VISION

The immediate problems like ***waste disposal, water drainage, thermal comfort and community interaction*** are addressed to in a smart and beneficial way.

CONCEPT

CONVENTIONAL HIGH RISE BUILDING

Conventional designed high rise buildings supporting 300 households, can create ***negative impact*** on the environment as well as to its surroundings. Such structures let alone ***diverting wind direction*** produces wind barriers in its local spaces. They cast ***deep shadows*** sometimes creating shady areas promoting non ethical activities. This also ***affects the micro-climate*** and the natural lighting for the surrounding lower rise communities. The recent years have witnessed huge deformation to create tall concrete masses . This has disturbed our ecological system a lot ***not allowing ground water recharge*** or natural rain cycle.

A FOREST

The design of the building is evolved from a forest, which not only support and provide ***living for birds*** also keep the surrounding calm and pleasant with ***proper wind flow***, limited ***shading from sun***, maximum ***utilisation of solar energy*** to feed their need. A forest doesn't only consume our limited resources of the Earth, it actually ***gives back*** a lot more than what it consumes to its environment.

BUILDING AND SUSTAINABILITY

The building consist of two ***modular element***, Modular Living Block and The Service Tower. The service towers are placed in a ***grid pattern*** and modular towers are inserted into it, ***responding to the climate*** in-order to achieve better indoor as well as outdoor environment ***comfort conditions, maximum utilisation of solar and wind energy***. The ***raising of South-West corner and lowering of North-East corner*** provides effective **mutual shading** in the building complex. The living blocks hanging between towers, allows l***east land exploitation*** maintaining the ***continuity of Water Cycle*** through recharging ground water. By ***reducing the thermal mass*** we reduce the heat gain as well as ***increase the retail value*** of households.

DISASTERS AND SAFETY

Elevating the Modular Living Blocks make the building ***resilient to natural disasters*** like Flood and cyclone (which is a major issue in Chennai with many losing their life and property in the previous year). The access to the block is only through the towers providing ***limited entry***, maximum safety and security to this huge spread community. The sustainable design even helps ***in feeding the community***, thus emphasized ***the principle of self sufficiency***.

THE FUTURE

Use of sophisticated ***sustainable concepts***, strategies and ***resilient features*** give the building the strength ***not only to survive for its own***, but to feed the community living in it . The modular form of complete building design with Service Towers and Modular Living Blocks allows flexibility with time and making it possible to accommodate more number of households in future with ***simple insertion*** of new Modular Living Blocks into the Service Tower.

DESIGN PROCESS

MODULAR LIVING BLOCK

Everyone prefers their space of dwelling to be the best, with some amount of ***privacy*** but ***good views*** and a good garden. Climate responsively , a normal cuboid is carved to have ***maximum utilisation of daylighting and natural ventilation***, reducing glare and absorption of solar radiations achieved through ***buffer space***. The building is to allow effective ***harvesting heavy rain fall*** and ***solar energy*** through its smart green building envelope. Taking these into consideration the ***Modular*** Living Block is designed and ***repeated***. A ***rigid grid pattern of beams and columns*** make a protective nest for living and ***transferring the loads*** on its respective towers.

5 floors are laid one above the other in a way that every floor has its own privacy and garden. This forms a Modular Living Block which is ***flipped or rotated*** based on the ***solar geometry*** ensuring ***self-shading*** to all the levels. The Modular Living Blocks consists of single rooms, single bedroom apartments, double bedroom apartments and penthouses. ***Service towers connect the modular blocks***, therefore more blocks can be added to the service towers in case to fulfil the d***emands of increased population***. Flying corridors are introduced to connect tower to tower, the volume enclosed in these corridors gives since for a beautiful and awe inspiring view.

THE SERVICE TOWER

A tree ***prepares food*** for us, it takes resources from the environment, shades us from sun and rain, ***purifies the air we breathe*** and also lets animals and birds live on it. The tower follows the same concept of taking all the resources from the environment to ***produce energy***, providing space to live within its branches and a well ***shaded space*** for ***human interaction*** beneath it. This gives a feel of suspending the modular blocks from trees ***reducing the plinth area*** and giving a dynamic feeling to the space. All the shared spaces are around the main service core transforming ***the building into a community***. The tower as acts as an energy generating machine. Spaces have been designed for ***community interaction and leisure*** in this. And since this is the only means if ***vertical transition and service core*** people will frequently use it thus promoting interaction within the community .The services are thus ***zoned*** together ***reducing the maintenance costs***.

FEASIBILITY STUDY

SMART ENERGY SYSTEM

An average household in India utilizes ***850 kWh/month***. That makes to utilization of **510,000 kWh/year**, for each Modular Block holding 50 households. Whereas there is average need of 9.0 kWh/sqm/year in Service Tower, that sum up to a utilization of 97,200 kWh/year. Now, adding all the electricity consumption by ***6 Modular Living Blocks and 8 Service Tower***, gives the total of consumption of ***3,837,600 kWh/year.***

Building is designed in such a way to have maximum utilization of Solar Harvesting through Solar Panels, Algae Filed Wall Panels and Optical Fiber Lighting; Wind Harvesting; Piezoelectric Power. ***Solar Harvesting*** produces an average of 260 kWh/sqm/year assuming 8% efficiency, in Chennai that makes up to a total of ***4,368,000 kWh/year***, throughout the complete building. Similarly, ***Algae Wall Panels*** will produce ***2,000,000 kWh/year***, assuming 5W/sqm/day with 10% photosynthesis efficiency. Whereas an average ***Wind Turbine*** with a capacity of 2.5-3 MW at a height of 160 m recieving minimum wind speed of 2-3 m/s produces 4.8 million kWh in a year. And installation of such 4 Wind Turbines on each Service Tower, will sum up to a production of ***19,200,000 kWh in a year***. And with installation of ***Piezoelectric Tiling*** in Entrance and around Gathering Space produces an average total of ***284,160 kWh/year***.

So, there is total average production of ***673.65%*** of the total need of power requirement of the building, which can be used to distributed to slum areas of the Chennai. Apart from this a huge amount of electricity from our day waste and with the evolution of technology using ***smart electrical products*** like LED Lamps can easily reduce average monthly consumption by 10-25%.

SMART WATER STRATEGY

There is an average need of 850L of water per day by each household, which adds up with water requirement in Service Tower also gives nearly a total of ***102,500,000 L/year*** consumption throughout the building. But considering strategy of using ***Rain Water*** (140mm rainfall annually) as portable water and using ***grey water for toilet flush, as well as for irrigation and landscaping***, and further purification of grey water to use it again as portable water can reduce the total consumption from Public Water Supply by ***45-55%***.

FOOD AND FARMING

With the ***high population growth rate of India***, according to the basic need ***food production rate is less*** which shows a need of Vertical Farming in the building to ***feed the community***. An average Indian family consumes around 2.5kg of food per day, which generally includes 60% of ***vegetable and crops***, and 40% rest. With an average floor area of 1500 sqm in each tower will help to produce a total of ***192,000 kg/year*** of green vegetables every year as well 600sqm in each tower will produce total 45,000 kg of fish per year in the whole building. Along-with it, ***Horticulture Farming*** at lower levels of Vertical Farming will spread **good aroma** in the whole building space.

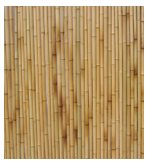
WASTE MANAGEMENT SYSTEM

Everyday, a household average produces an average of 250 gm of waste which consist of ***80% organic waste***. So, there is average 80-100 kg production of waste throughout the building annually. Whereas assuming production of 0.02 m^3 of ***humanure*** per day produces a total of around ***9,900 m^3 per year of Waste*** from the whole community.

An average family consumes around a 14.2 kg ***LPG cylinder for cooking*** in 24 days, which gives a total consumption of ***66,000 kg of LPG for 300 households annually***.

Biogas Plant has capacity to produce energy ***0.3-0.5 m^3 gas per m^3 digester volume per day*** as well fertilizers for farming. The total collection of 9,960 m^3 organic waste in a 1250 m^3 Biogas Plant of each Service Tower basement, gives a total production of ***1,454,160 kg per year Biogas***, and again the excessive can be supplied to the slum and the community nearby.

SECONDARY BUILDING MATERIALS



Split Bamboo as infill and louvers (bamboo is easily available)

Styrofoam mixed with concrete used in slabs and walls (reduce the weight of concrete)

Coconut wood for flooring and infill.

Waste tetrapack used to make roofing

Oxide flooring : Cheap, variety of colours and cooling effect

China mosaic Tiles : Water Proofing

CONCLUSION

The man who taught India to be self sufficient also taught to "***be the change that you would want to see***" . The tall towers represent strength, interconnections speak to us about the community bonding , hollowness despite of having 300 households teaches us humility. The common plaza talks to us about leisure through interaction and community living . The grain and fruit harvesting makes us independent and teaches us cooperation. Thus this an edifice that truly represents Mahatma Gandhi 's vision of India , where community living and sustainability is what that rules the design. Living in floating blocks we still feel grounded. The Panorama that soothes are eyes calms us down, controls our thoughts and opens a clear vision