

# Glass in Buildings: Design and Application

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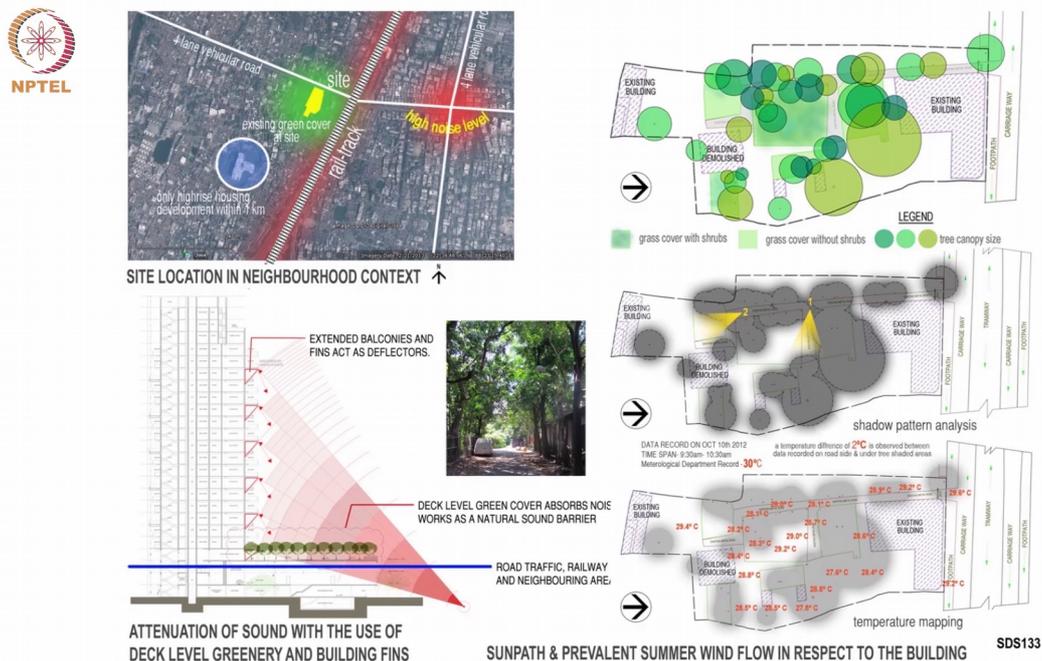
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## Case Study :The Untold Truth of the Unbuilt.

[noise]

Third case study ah we tend to take you through its called the prana which was a residential tower designed in kolkata when we went to the site we got the usp on the site you know [vocalized-noise] we saw that it was filled with the best thing that kolkata needs trees.

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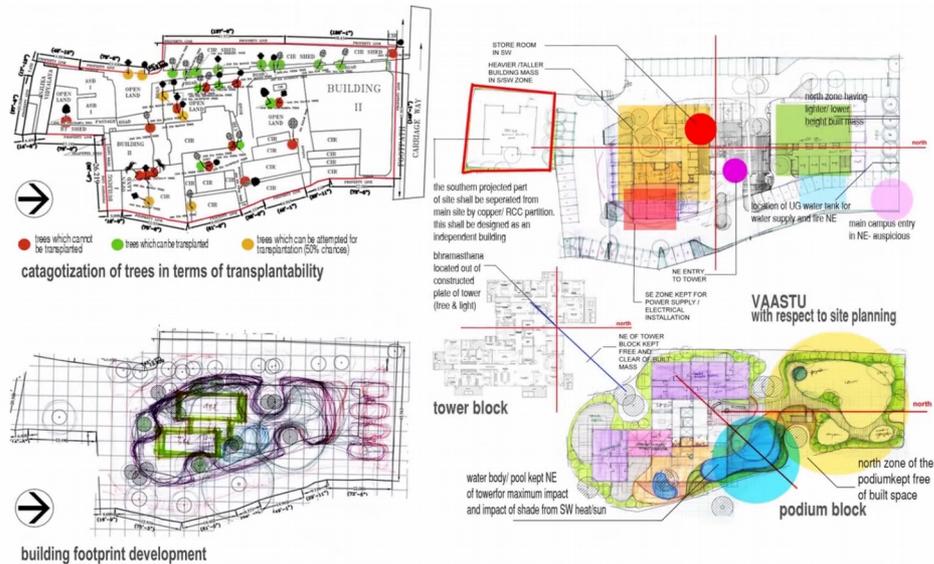


And it was quite criminal for us to think why want to do what developer does can we leave it the way it is, but having said this one we were inspired that can we lets see and if we can really do something keeping the trees together and thats what the name naming had originated prana its about life life for us is the world around us essentially the flora

So, this was a site which [vocalized-noise] has wonderful ah tree cover as you can see and when we went below the tree we could see that the temperature fall differences almost like four [vocalized-noise] four degrees. So, on the outside to the to the shaded areas very visible very perceptible difference of falling temperature. So, it was a microclimate which was quite inspiring we understood what was the another problem there site was it was the usp was a tree well the problem which person developer find out eventually was the railways next to that we had a railway line and next adjacent to the site and the snarl of the engine and the third of the locomotive was the big issue in terms of its sound and noise

This was a challenge because the development was focused essentially for the high class and we looking for a solution all around how can that be what to do around. So, its very simple thing you know dgu would take care which were ok that takes care of sound not coming inside.

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But what about the life that comes in the terraces we want terraces to be seen ah people to enjoy the terraces. So, when we went to heights to the neighbouring height ah see whats around the third issue came which is it actually in the urban issue was it was overlooking a lot of slum development and ah good or bad this was it of course, its not a

great thing to see, but that's an important thing to understand and be sensitive about urban design.

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So, we didn't want to make very stride building which was telling itself that I am ah I don't want to look at you, but I am like completely opaque I have no connection with you guys. So, what what kind of a [vocalized-noise] language if I just wrap the building around with an opaque facade d'gus no balconies nothing how does it work because just for the sound. So, you rather try to work around for both the views the client said he would not like the high [vocalized-noise] segment to look over down into the ah slums neither would he actually appreciate ah [vocalized-noise] the privacy being breached.

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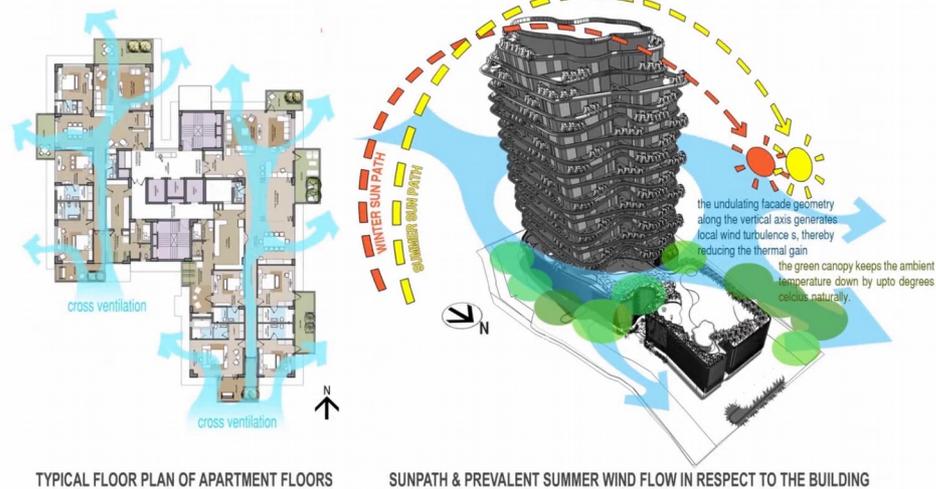
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And all these factors which are there [vocalized-noise] for the high glass [vocalized-noise] the other important point was how do we handle the sound in terms of. So, can we make a facade which would actually attenuate sound which would deflect can it be baffle design and can the design be done in such a manner that becomes a object of appreciation for the community all around and this became a very important point if it was green can the high people can we give them terrace screens to the [vocalized-noise] to the extent that they can also do their vegetable farming

So, when we laid down all these things and we were looking around for solution we kind of got inspired by the footprints and etcetera how limited footprint can it come or we got inspired by the biomimicry around ah we could see the molds and the mushroom the kind of umbrella the molds and you know [vocalized-noise] they were they were like kind of having cantilever is from the timber which was from the buck from the main trunk and which was existing. So, they would cantilever and become like a planer ah like a planes and they would take sunlight giving us the [vocalized-noise] the answer that can the terraces can be carved out something [vocalized-noise] which can go as extended terraces in symphony with the [vocalized-noise] form or the verticality and that would take care of the deflection of the railway the sound from voice from the railways and can also give platforms for green volumes they will also cut off the angle which was needed for the pvc the the reaching angle this is interesting and it started all when we went to the site when we went to the site the time wanted a high housing when we went to the site the

site was high was the earth it was full ah big trees and in my heart it was tricking that to tell the client.

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Lets not build anything here, but that man has paid a huge amount of money

So, [vocalized-noise] we thought lets lets keep this trees and think something beyond never issues at site one of the important issue that site was the railway line next to the site ah which actually was a source of a major [vocalized-noise] problem about the noise from both the third and the snarling of engines alongside those on slum development [vocalized-noise] which was visually not in the interesting side though, but thats an urban design issue. So, which had to be catered a different level at our level we wanted to make a design which would keep the trees intact which would take care of the locomotive noise around and would also become a very interesting site for the slum dwellers to look up to and also for my hig dwellers not look into because they would not like to see a slum all around.

With all these we wanted to have can give give each apartment a terrace screen to grow their own vegetables. So, we just calculated a nuclear family would need about on a on a on a vertical farm intensive cultivation drip course etcetera ah we thought about eight hundred square feet of area would be needed for an apartment to grow its not full, but its

interesting vegetable garden for each one and what what will become interesting [vocalized-noise] addition to the urban living

While we were looking around we got inspired by the mushroom and the mould on the walls on the back of the trees they were giving us a solution giving a solution to have cantilever and cantilever ah just opposing each other into some kind of organic form another visual nice site which you notice on the back

The trees are doing a lot of drama the trees were actually controlling a lot of heat from outside they were giving birth to their own microclimate and we mainly measured it it was almost four and a half to five degree difference from the outside and below [vocalized-noise] under the shade a nice transportation gain was helping us to [vocalized-noise] give an environment of alpha forest living taking up forest vertically was something exciting that we wanted to do and make it sensible and sensitive to the high dwellers (( )) [vocalized-noise] ah can we have a facade and we also actually contributing can we have facade which would actually add a select baffle to the noise can we deflect the noise partly absorb it partly deflect it

So, can we have this overlapping organic balconies ah made up of some kind of acoustical mix which is now actually basically its an acoustical mix with grc as a cladding device essentially the steel cantilever on the cladding we added these [vocalized-noise] these panels which would actually deflect the noise and act like a [vocalized-noise] vertical acoustic baffling unit and reduced intensity both in terms of absorption as a reflection

So, when we took over to this it design it was it was two apartments per core and they were designed with full flexibility. So, that the high develop can have the the apartment or the owner could be flexible in shaping its indoor spaces without light and ventilation and each one had this play of balconies staggering at three different ah levels ah [vocalized-noise] in three different forms that each one is actually terrace a part of it can be a balcony, but all around wrapping it acting as like the mushroom which has grown vertically and the mold and each loaded with full greenescapes.

So, when the program was in the lower level we had this club which was having the green and the facade of which was having its exo skin was made up of grc louvers inside was glazing the louvers was again to cut the glare ah [vocalized-noise] from the

adjoining the adjoining mass and not even because we didn't want the heat to be reflected straight up onto the leaves and the neighbouring trees. So, we were sensitive and not to reflect a substantial heat to the joining plants and flora and fauna will disturb their ecological habitat.

So, we wanted to build around something with timber. So, we had actually gone for [vocalized-noise] had an option of wpc also and not timber because timber [vocalized-noise], but look like timber not timber the whole design was done keeping the solar shading factors etcetera cantilevers, but interestingly when the design evolved it evolved to give us a vertical eight hundred thousand square feet terraces not even green having enough [vocalized-noise] and the staggering allowed every green terrace to live by itself to sustain by itself up that was interesting and we [vocalized-noise] actually act as when we [vocalized-noise] examine the model on the acoustical up design. So, we actually thought that it was attenuating around forty five to fifty percent of the of the locomotive noise and we actually cut off all kind of in impeaching up vision lines from slum to the residences by having discontinuation.

So, this design is an evolution of vertical living [vocalized-noise] both sensitive to the nature to the existing scenario without challenging up thwarting the existing situations meet the locomotive sound or beat up the kind of dwelling around you you can still give birth to a something pleasant both for the environment and the people around you both case study is interesting one where we got inspired to make a design which would essentially target a restorative architecture [vocalized-noise] architecture which would start giving back to the environment. So, this project is called biome kolkata and the project is a basically mixed use development the client was a developer who wanted to make his corporate office.

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# BIOME

category : unbuilt | mixed use  
 location : kolkata | india  
 site area : 2175 sq.m.  
 built-up area : 9000 sq.m.  
 estimated cost : Rs. 4000/- per sq.ft.

Situated in the mini Business district in an otherwise residential mini township in Kolkata which was planned in the 1960s to accommodate the burgeoning population of Kolkata.

The place has become an array of building blocks arranged in regimental lines. The dense residential township has a large sports complex, mini administration and health districts which bring a lot of floating population to this place. In this building neighbourhood, there are hospitals and state cultural embassies but no community level interactive spaces like clubs or eateries.

### context

- medium Scale
- presence of hospitals and offices without visitor amenities
- urban dystopia

### response

- open and interactive building face
- bigger green footprint
- street level cafe

## MINI BUSINESS & HEALTH DISTRICT

presence of uninteresting buildings and lack of on-street activities

## SOCIETY INCUBATOR

the neighbourhood demands a space of inspiration for work and life

## FUTURE ADAPTABILITY

the regimental 60's township with identical blocks making the place static and unattractive to modern technologies

## BIOPHILIC DESIGN

inspiration from participative green spaces to kill the urban disdain like cellphone sickness or social media



salt lake stadium site location

east kolkata wetlands

0 M 10 M 20 M

primary access road section showing massing in elevation of the neighbourhood



He also wanted to make some offices which you could actually sell and make the project more viable he partnered with a landowner who wanted to make convention. So, it became a mixed use a convention in the lower level offices in a vertical level how we intervened and ah the work spaces for future was essential thought which shaped (( )) the architecture

Coworking spaces social spaces together become the energy in an office this takes of the fatigue designs have to be more biophilic to lessen the stress they have to include the nature around them they have to enjoy the changing twilights if i can engage with birds around me butterflies it will lovely and that takes off all the stress in the workplace you become more creative you reduce absenteeism your health improves by more than thirty.

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# TO DESIGN FOR THE BEST HUMAN DEVELOPMENT & PERFORMANCE

An urban guy spends two third of his life in the work-space, therefore the work-space should respond and nourishes the mind-space

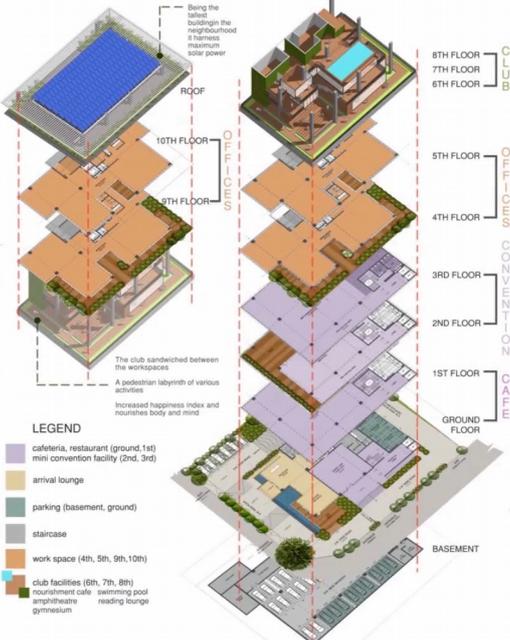
**WORK-LIFE BALANCE**  
to engage in activities beyond work

**INTERPERSONAL SKILLS DEVELOPMENT**

- good food health
- community connect
- reading thinking
- business success
- society celebration
- green connect
- workouts for body & mind
- day dreaming



## SOLAR FARMING



So, a design which would become the best in terms of wellbeing or can it be a well [vocalized-noise] well standards can be taken care in terms of its best specifications taking you to biome the site is in salt lake sector five when all the buildings are straight glass facades or acp cladded we didnt want either of them glass is sensitive a too much glasses no no class

So, we wanted to building to actually say that today there is about making it more green not just of rating in performance by in terms of its active greening can it hub more and more plants trees along with it. So, we had these trees in the design as tall as twelve meters and at height of more than twenty five meters. So, we had this convention center in lower level with cafes and thing like this and then we had this offices which were actually vertically stacked and in between them we had a big space basically called the forest floor which would have all the social spaces the meeting spaces ah [vocalized-noise] the interesting food courts and if in the areas.

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YOU ARE BECAUSE YOU CAN  
**THINK**  
BIOME | BUILDING THE MIND



Sections across the building showing stacking and grouping of facilities across floors.

While, the F&B and convention facilities are located on the lower floors, the offices above are interspaced with the community facilities at the heart of the building comprising various health and leisure zones including an amphitheatre, pool, jogging track amidst greenery, cafe, lounge and reading room amongst others.

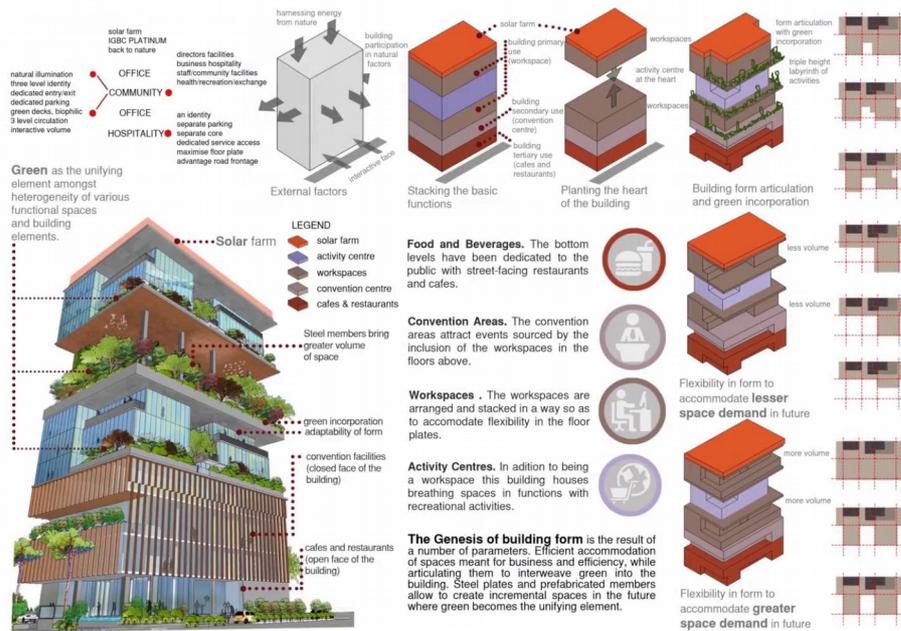
Parking is stacked in the basement and in a rotary at the rear of the building. While the roof acts as a solar harvesting farm.



It will also have a jogging track it has a meditation spaces swimming pools and clubs and altogether around fifty full grown trees and that is something which was the usp of this design [vocalized-noise]

A facade which would actually become more greener over the years we know that kolkata is least among the metros in terms of its green cover we actively want to increase the screen cover and plots like smaller plots like the one for biome would not give much to bigger trees suppose we have substantial about twenty trees being planted on the perimeter together we have given birth to around seventy nine to eighty trees will grown trees in the entire building mass with a solar farm kept on the top

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The plan was very simple, but it was engaging how we handled the urban forest the facade was critical because not only i had to allow a lot of ventilation views and transparency, but it also had to change for future two important constraints were there can the facade accommodate air taxis in future by twenty twenty six twenty seven year of air taxis they relate maybe, but soon in the future you will have people try flying up can we have emergency taxis taking off from terraces and can in future if i want to change his office in something else can my facade adapt to. So, we had got his panels [vocalized-noise] which were offset from the cantilever terrace the cantilever portion was all green in the perimeter and these panels were basically retractable and can change its geometry they can be fixed or loosened up the way we want it even the flow paid was steel modular steel. So, they could actually increase or decrease the intermediate flow rates without changing the basic grid structure and at every third level we had this extended green terraces all around

The section makes you clear in terms of massing we have got a conventional layers below and then comes the three probates of the transplant offices with its green around it then we had above and then we have our three levels of offices on the top between them we have got this forest floor which is the labyrinth of all facilities its a place which establish the social balance and bring the work and play together

People are suffering in offices because of sick building syndrome or the synthetic environment that the facades bring can the facades be more natural. So, while we had this this green in the facade to take care of the [noise] biodiversity inclusion ah [vocalized-noise] the spillovers of outdoor semi auto spaces the engaging spaces we also wanted to see how the facade changed over the years can people tomorrow if they want to alter something in between my external doesn't actually get disturbed why if i want to change the glass intermediate glass panellings and massing and will change position of intermediate terraces by the bigger terraces which carry the trees become more of containment and they also hold the cables together on different levels these cables would actually real vertical green and that's what the slide shows how your facades which are basically ahead in front of ah the the office spaces not the social forest floor for the office spaces that the cables can then be added on the facade and you can actually real active green on them

So, in future you can actually make them as more greener facades if you really want to do and this was a kind of flexibility we wanted to bring in the facade, but not [vocalized-noise] because by putting into lot of complicated [vocalized-noise] technology, but by incorporating something more sensible and more human friendly. So, while the technology was simply adding a cable ah with mesh around which would bring the green vertical

What it increases was the hostile environment around in terms of its ah pollution and industry pollutions on the above level while the particulate pollution in the lower levels all come together perform the facade the green facade can take care of this kind of a situation (( )) of the architecture because it is for us that we need to do such designs it is nothing to do marketing or selling it is sensitivity the facades had to be more transparent more engaging with nature hence we thought of taking the entire flora [vocalized-noise] vertically.

In the entire mass they are massing we got about eighty trees when i say eighty trees i mean full grown trees approximately about twelve meters in height. So, one would twelve to fifteen one would need about three floors to engage a building. So, the entire design became a cluster of vertical [vocalized-noise] bundle of three floors each we wanted to actually build in a lot of sense in for future reuse is one thing important that we should consider can we actually change facades alter them modify them without

changing a structure can we have facades which will be green and even if we change anything inside it should not disturb the screen this was about the design the design also had to make a handshake for transportation system in future.

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We will have air taxis by twenty twenty seven dropping you at transport or transfer levels this is going to be vertical transportation systems. So, we had got terraces which can actually take off for both emergency as well as for usual flying of air taxis on vertical levels

So, facade handling a mixed use development we have convention center [vocalized-noise] level below and then with offices in clusters of three bundles of three in between because the social hospitality floor which was made as the forest floor the forest floor at co working spaces a few layout outlets marketing spaces therapy spaces meditative spaces gymnasium health areas it was up this was something including a jogging track in that level people can go around

How did the facade became important its in two parts one we wanted a facade which can actually change. So, the panels which can be removed and plugged in thats about the three levels and in front of it we wanted after the trees have grown to their capacity over next three four years [vocalized-noise] the usual tree that we planted in the perimeter on

a depth on a terrace which was extending more than four and a half to five meters cantilevers we wanted cables to be tied vertically engaging the three floors of four meters each. So, almost about sixteen meters in height and grow more green on a perimeter

So, in case there is a change happening construction thing is happening change is happening in the internal levels of the three levels in terms of their ah modular design because each floor is made up of a steel panels which can be removed and you can actually modulate the floor plate of the three floors except those [vocalized-noise] extended [vocalized-noise] areas and that would also demand the change in the facade. So, there was an exo skin of this green coming and the inside floor plate which was having the glass facade could be maneuvered and changed with such kind of a facade systems both the glass and nature can coexist and give birth to a much more sensitive and sensible living it will not only enhance our performance because we will be living in a biophilic environment engaging with butterflies and floras and fauna and colours and birds all around you would be tapping into fresh oxygen you know effects fresh oxygen to live together be with it

It will also have a very great improvement into human dna in kolkata we are suffering from [vocalized-noise] lung diseases asthmas absent ism is one of the very common things in offices and to get beyond it we mean to make our office environment much more sensitive and ecologically integrated even if it is vertical small plantation here and there would not do we need to actively include vertical forests and engage people admiring and respecting nature we are the curators of our own world we need to respect our building envelope in its symphony and harmony [noise]

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## Summary:

By the end of this module, you have learnt about the:

- Case Study 3: The Prana, Kolkata
- Case Study 4: Biome, Kolkata

