Strategies for Sustainable Design
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Lecture - 14
Current Scenario of Sustainable Design: Indian

Hello, everyone. We will discuss about current scenarios of sustainable design in Indian context. So, we will see in this lecture about some case studies and some efforts like how these sustainable like practices can be bring can be brought into the everyday design of the houses.

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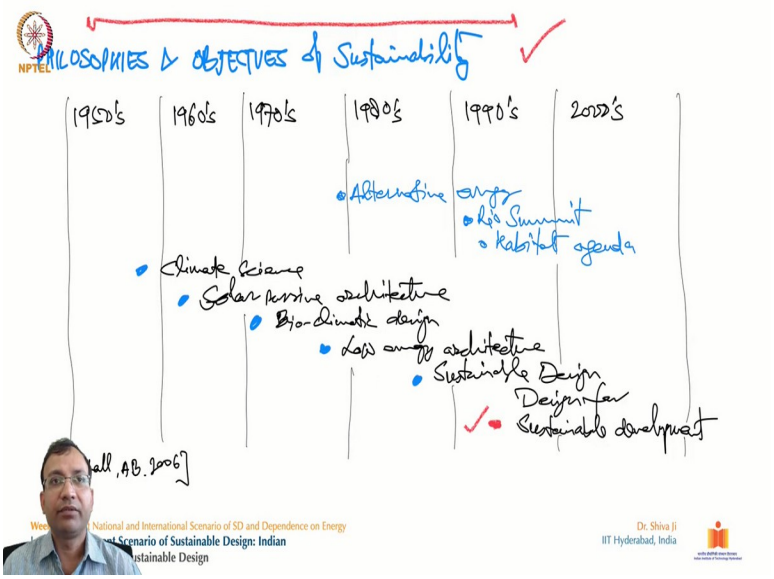

So here, if you see, like, how this has progressed, we are starting from here to understand, like, how the objective of sustainability has started evolving. Over the few like the last in the few decades, so if you see in the 1950s, it was miserably like there was no such a particular discussion okay or you know any mention, particularly about sustainability or the environmental concerns and things were going as it is.

And it was kind of n accepted thing. How the things are kind of like you know okay but it started coming into play in the design and a construction about the climatology in the decade of 1960s. And after that it started with a solid passive architecture in the modern constructions in the modern designs.

And then came the bio-climatic design inputs. So, they became the topic of the discussion in almost another decade of like 1970s. When these are bio climatic factors in their design were started taking place. Then came a low energy architecture, like how the energy requirements can be minimized and then started this, the trend of like environmental sustainable architecture.

So which spoke of about improving on the environmental factors of the like sustainability, which we know as in the recent times and then lately in the decade of a 1990s, then it started the discussion started happening about architecture for sustainable development. So, how the sustainable development goals, how the sustainable practices can be integrated into the architecture and design?

So, that was period from there, it started happening in India. So, this is a reference I have taken from Ashok Bilal architects. He is a famous architect based out of New Delhi, and he is a great thinker. Also, he has designed several interesting buildings which cater to this goal.

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So, let us see some of these, some examples which I have taken to discuss about in this lecture. So, here if you see the feature of a strategy of planning, like urban, terraces, roof gardens, so, greening the top surface of the building. Well, what could be the objective to make it green was the purpose. So, the purpose is in the respect of the urban heat island effect.

So, the UHIE is a phenomena where you know concentrated places such as like cities and bigger towns. They have a lacs and lacs of house is constructed and as a whole, these buildings, they are made up of several heat absorbed materials, such as bricks, stone you know metals you know, tiles and several other stuff.

So, these are materials, absorb a lot of heat. So, how this heat can be reduced because this heat creates a heat trap and the entire surrounding of that city gets heated over the time. So, this amount of this heat creates a several types of problem like it. It starts absorbing that heat.

It starts retaining some gases and it starts retaining the particulate matter and it still, it gets accumulated over the time. And it creates health related problems. It traps a lot of light in it and we see that residual light reflection in the night sky of the cities. So, that is because of this kind of like effects which happen in the bigger settlement areas.

So, this effort of terrace garden, it is conceptualizing, and it is proven also with the help of several executed designs, this works in reducing the overall a metal footprint of these construction based materials, and it reduces the overall heat in that area and it minimizes energy consumption also in the building. So, this is one of the strategies, which works very efficiently to reduce the heat impact.

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So, here in this one, we will talk about how to improve on the social interaction part. So, system where social sustainability is one of the major aspects of like the sustainability. How this sustainability can be integrated with the architectural system, with the built environment, with the built let spaces. So with the help of intentional designs, which improve or which promote social interactions this can be achieved.

So, you can see some sketches over here in the lower right side okay. So, this green is sketched area. It is pedestrian movement pedestrian path, but given within a society. So, one like the inhabitants of this society will be taking these paths and they will be moving around these buildings, in a way like integrating them and bringing them closer to the other people of the society.

So, this is one of the like direct methods of promoting social interaction in any given society. The next one you can see, like having community buildings. So, the buildings which are dedicated for the community uses such as convention hall, such as like libraries, reading rooms such as common playing area such as common like recreational areas such as common areas where one can sit together and discuss.

They can discuss about like the administration of that society. They can discuss about the interaction, and they can discuss, too. They can need to celebrate social functions and events and the festivals okay, together. So, these buildings also in turn promote. So, these there should be a provision to have such community spaces, community buildings in and around the societies. The third one talks about the parking area.

So, the parking areas also provide an opportunity for social interaction. So, the parking and groups also is taken as a improvement for the social interaction area, but they are kept at the outer periphery of the society in order to keep the vehicles away from the inner areas where kids their elderly where all of the inhabitants can freely enjoy and walk. So, that is the this is the reason these parking's are kept on the side and the periphery of the society.

So, that one does not have any intention, for example, if a kid is playing in this greener area so the mother is not bothered that there may be a vehicle which can create some disturbance for my child. So, such kind of attention free spaces are very necessary. So, how design can help over here by using like elevated spaces, by using a maybe a restricted areas. So, that there is no access available for the moment for the cars to come inside or the vehicles to come inside.

So, this can be forced or intentional strategy adopted to improve the social interaction in any given society. And then the last one it talks about, like the creating like the unit layout. So, if you create such layouts. So, these layouts can be replicated and can be can be implemented at several places to emulate this concept. So, these are softer strategies adopted for improving social interaction in the given society.

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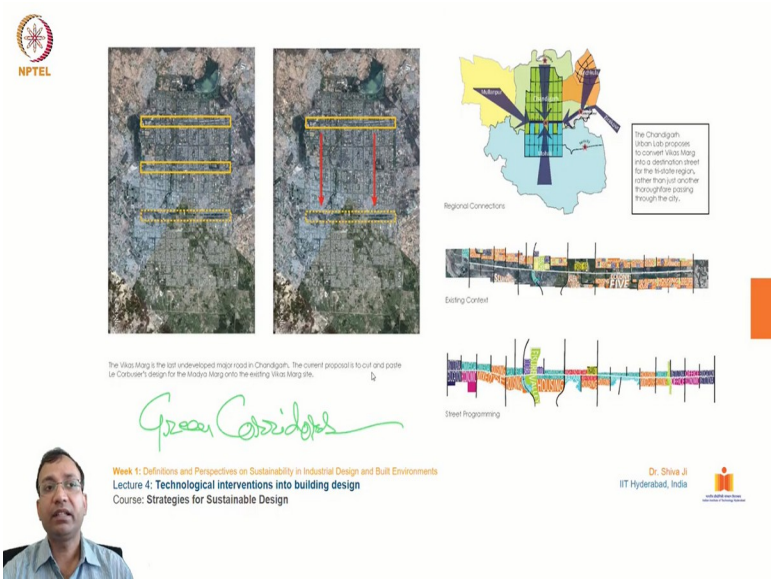

In this slide, you can see like this is a satellite map of a city of Chandigarh in India. So, this Chandigarh is very known for like it is grid layout okay of the different sectors and orthogonal planning and vehicular movement. And even with all of these, massive scale like of buildings, which Lee Corbusier designed in the 1950s and 60s at that time.

So, he incorporated greener like you know, strips which were crisscrossing different sectors. So these greener areas, they start from like one end of the one sector and they move from the sectors within and they crisscross entire the breadth of the Chandigarh city. So, it was like being visualized over here like this you can see is one of the major arterial road. So, this was proposed to have these is main convert to cross Chandigarh from one side of the Chandigarh to the other side.

So, it was designed it was conceptualized from like this Chandigarh urban lab so they proposed to have a breathing a green corridor where not just the vehicle will pass even the pedestrian movement, even the cyclist movement, and even there will be a huge presence of greener elements such as trees, bushes and plants to minimize the effects of the side effects caused by the traffic, the fast moving traffic.

So, this is an integration of the breathing spaces with the highly functional requirements. So, by strategizing like in such a way, even entities such as like highways and these like connecting roads can be also designed in such a way that they have lesser emissions and lesser impact on the surrounding areas and residential areas which are right present in the next sectors. So, by

providing a dense like vegetation and trees and bushes, one can minimize on the noise pollution, one can minimize on the like the air pollution. So, these things can be taken care of.

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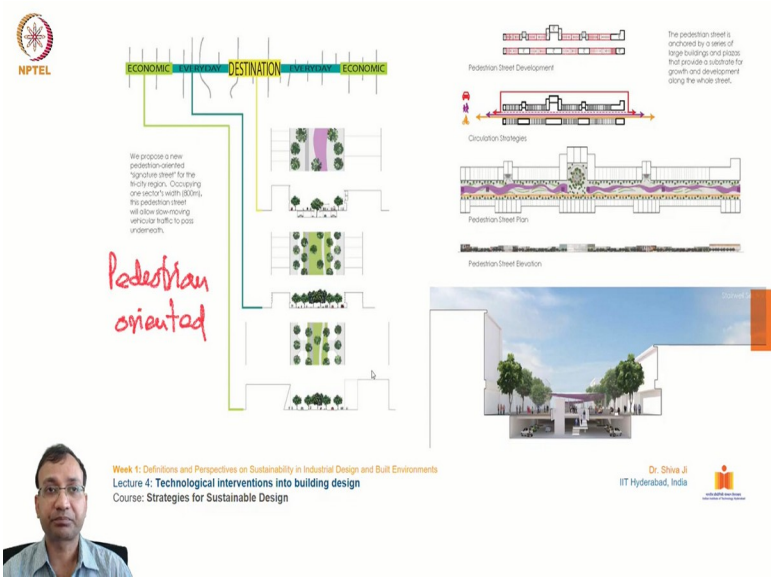

And here are some more details are given over there the house, the visualization of this road was taken care of. So, the road was given the space in the lower side of the road. So, the under the ground and then the pedestrian and other recreational areas and the greenery areas were planted on the ground surface.

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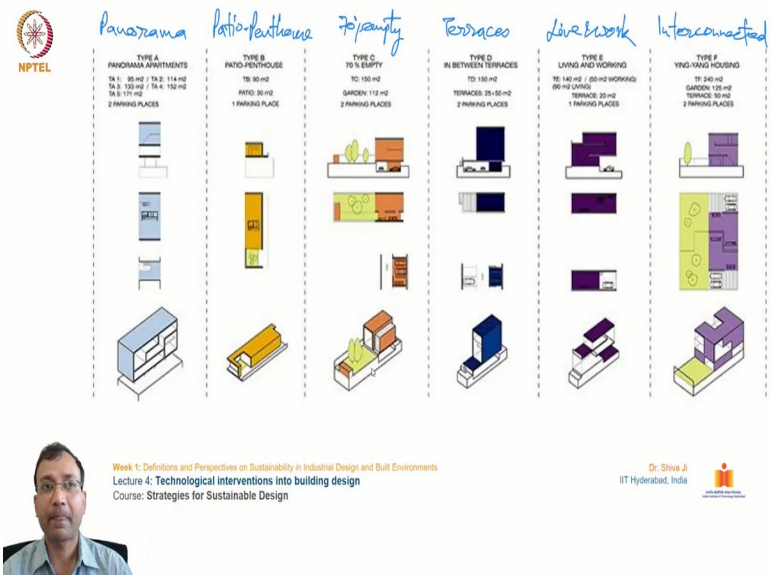

In this illustration how we can see like how different types of the massing and the arrangement of the activities in any given structure and building can be designed in such a way to promote social harmony and interaction. So, the first one you can see, this one is a format of panorama. So, this one gives a huge volume of like exposure to the outside.

So, for example, if there is a greener area or the forest area or something like institutional space or some recreational space or even a market space, so the neighboring buildings can adopt such a panoramatic view to have to maximize the view outside. So, viewing is one of the traits of human comfort. So, how this can take advantage of this Panorama strategy?

So this is a quite evident from this sketch over here. The second one talks about patio and paint house creations. So, such building typologies they adopt quite a wide open spaces. They involve greener space also. They include some like vegetation also creating a nice ambiance and creating a nice atmosphere within the premises of that building.

So, this is also one of the very good strategies for having a ecological you know a building which corresponds to the surrounding the building, which corresponds to the ecology. The third one, talks about living 70 percent of the space empty for greener and open areas. Well, this is a strategy, which gives a lot of emphasis for like creating open spaces, creating empty spaces, leaving spaces empty and reserved for grass and a trees and bushes and plants.

So, that there is ample space left for receiving sun, receiving rain, receiving the natural elements in plenty, so this is one of the strategies which supports lot of exposure, lot of direct integration

of nature to the site. The next one talks about having, terrace's. So, on terraces, like in between terraces also multiple interactive terrace's. So, Terraces are also one of the refuse areas which promote interaction and fluidity in any given space.

So, we can use these terrace's also for having some small, ctivities like cafes sitting areas you know, reading areas and such activities, planned in this one in turn by helping the society to have you know enhanced interaction.

The next one talks about live and work. So, this is mixed use building we discussed earlier. So, how the same building can have the variety of usages because generally we live at one place and work at some other place. So, this in turn induces the demand for like traffic because I need to go from the place of living to the place of working.

So, why not to have, why not to promote such a practice where these two activities can be kept as close as possible maybe even in the same building, if not that far? And if even if it is at a distance, why cannot we this be at in a distance of periphery of or maybe a cyclist movement or maybe a pedestrian movement.

So, such live and work in the vicinity will reduce you know direct emissions from the traffic. And it will give ample time for the person to have with their family or at the in the office. Why instead of wasting that in the traffic. The last one talks about n interconnected union yin-yang housing technique.

So, in this one activities are interconnected. The housing units are interconnected and they are kind of overflowing between from one to another. So, this links the structure in a way in a more deeper way. This forcefully encourages the interaction in the society. So, this with this we saw some of the strategies with which one can induce interaction in the society.

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Let us see some of the more typologies over here on a major scale at the scale of a neighborhood like how this this kind of like social interactions can be enhanced, can be generated, can be created, can be given in any city sectors or city areas. So, the first one you can see in the high rise buildings. So, in the high rise buildings, a number of floors can be reserved for common interaction, refuse area, for those are refuse areas for safety and such purposes.

But these like there could be several there could be some dedicated spaces and floors reserved for social interaction and common interaction by in turn promoting, social interaction. The next one talks about the perimeter block housing. So, in this one the movement is restricted on the perimeter so that the vehicles cannot come inside the living areas in turn by promoting greener spaces in the heart of the neighborhood.

The next one talks about the courtyard housing planning. So, the courtyards are very integral to the vernacular architecture of most parts of the Indian states Indian region. So, this kind of planning also helps in receiving natural elements in plenty, as well as creating an atmosphere of homely activity in the, on the site itself.

So, this kind of typology can be utilized for creating housing in the recent times. And perhaps the next one talks about cluster housing. So, the group of houses can be kept together? And these services can be combined in one place, for example, like parking and other amenities. So, in turn living a plenty of space, which can be a common area for them, for their leisure activities such as playing, sitting you know and these kind of activities.

So, the children also can get like open spaces. Elderly can get you know wider spaces for walking and movement and playing, et cetera, then comes to row housing. So, of course, this is also one of the more most successful like schemes and most successful strategies forward across the world to have number of row housing. So, in this also number of activities, number of amenities and facilities are shared among the inhabitants and the maximum, like open areas can be combined and utilized for common activities.

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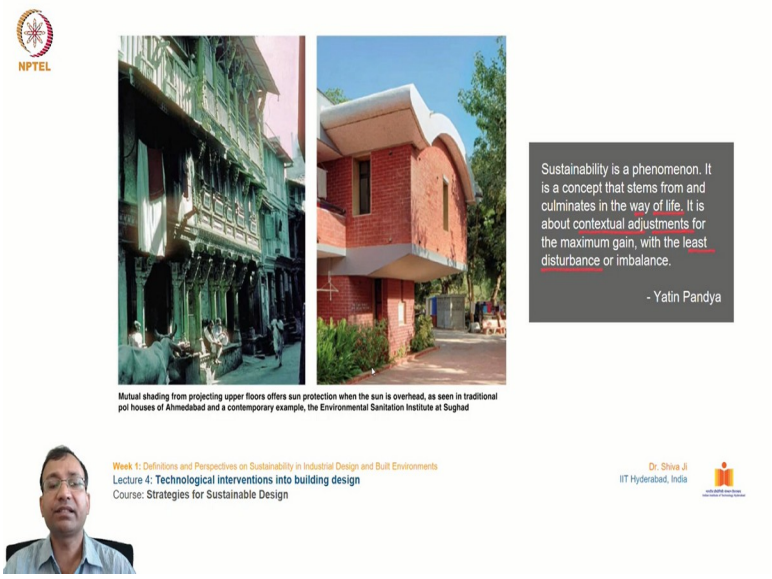

Some examples we can see from different, vernacular architectural practices from different regions of India. As you can see on the left side, this picture is from Ahmedabad. This is from the residential areas where the houses project little bit on the in the walking aisle side, in the walking galli side. And they become sunset for the people to sit on the lower levels because Ahmedabad is for falls under very hot regions.

So, some months are relatively very hard. So, at that times these architectural features, they become very useful for creating habitable spaces on the lower floors. In the second picture, you can see the same kind of technique is used in this building. So, this kind of philosophize can be even transformed into new construction practices and things which are happening at different places. So, here we have one thought by architects like Yatin Pandya.

So, he talks about like sustainability is a phenomena. It is a concept that stems from and culminates in the way of life. It is about contextual adjustment for the maximum gain with the least disturbance or imbalance. So again, we are seeing those the same keywords which are very

much inherited, which are very much integrated with this concept of sustainability, contextual requirements.

So, their design should fit into the given context. And it creates the least disturbance or the least imbalance to the overall, like the ecological that footprint over here. So, these are the thoughts given by a very famous architect Yatin Pandya. And many of his designs, they follow such practices and very earthen designs.

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So, few examples we will see here. On the left side, you can see in this picture, this is jolly or the Stone Jelly or the fenestration they are created. So of course, they are a beautiful piece of aesthetic and heart. At the same time, they work as a sunscreen. They work as you know, filtering the sunlight for the like in the desired quantum.

So, the inside, inner space is they receive sunlight, but in a restricted manner and in turn they create a buffer area also from outside to the inside. And the same kind of a philosophy is used even in the recent times in the modern building. So, as you can see on the right side. So, such fins work as you know, creating buffer. So, the interior habitable spaces are not situated, not placed right at the surface of the building, though they are kept at a distance. And that distance becomes that buffer zone by using it as a corridor.

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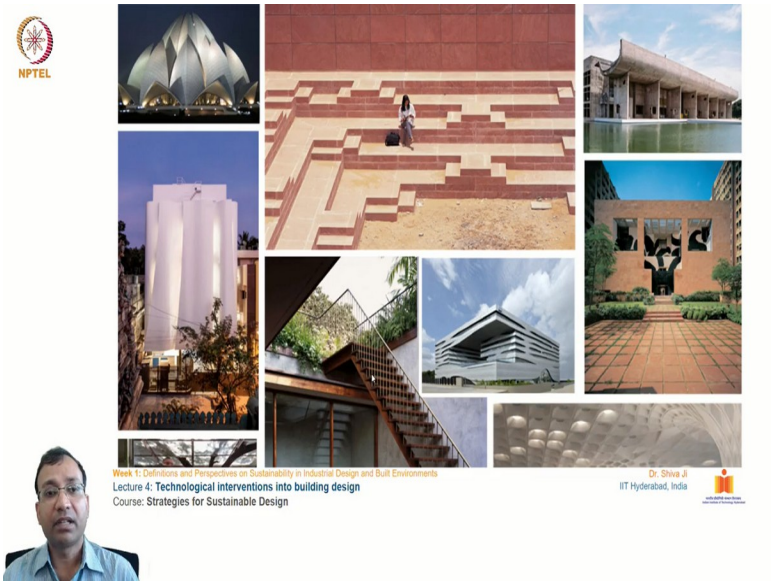

Some more examples are here in this slide. So, you can see some of these designs very famous from different cities of India. So, they take care of the vernacular features of those regions. For example, the central top picture you can see this is from Jawahar Kala Bhavan in Jaipur.

So, the architect of this, the late Charles Korea, he took inspiration from the Bauleys of Rajasthan, the water bodies of Rajasthan, which are manmade for several centuries in stone. And they used to store the ground water for the summer months. So, this is stepped a fashion he has used for a creating n interactive space in that premise.

And some other buildings you can see they are utilizing natural local materials okay such as like stone which is crisscrossed by like the grass and other vegetation. There are pergolas used to create buffer spaces from the outside to the inside so that there is a buffer zone between the interior and the exterior, creating comfortable situation comfortable temperate condition in the interiors.

And there are several other adoption's also in terms of creating sunscreen, by using material such as concrete such as even like stones such as steel, even clothing also such are the innovative, adaptation in the recent times, which have happened in India.

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So, one beautiful project, which I would like to mention over here, so this project by architect like Christopher Charles Benninger. So, this is an office building, which follows traditional architectural systems using the modern technology. So, it is a beautiful amalgamation of vernacular as well as modernity. So, in this one, these office buildings are created over here by utilizing the subspace, the subsurface and bit below the ground surface also.

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So, he has you can see in this illustration, he has utilized some vernacular and cultural features also such as this deep stump. And he has utilized water bodies to create like. Well this building is located in Pune in the city of Pune. So, this water body creates this microclimate.

This gives with the help of the evaporation, water content in the air in turn cooling that air. So sometimes, like the people can sit outside in the grass they come out in the evenings and they can enjoy the view. So, this is philosophy applied in this particular project.

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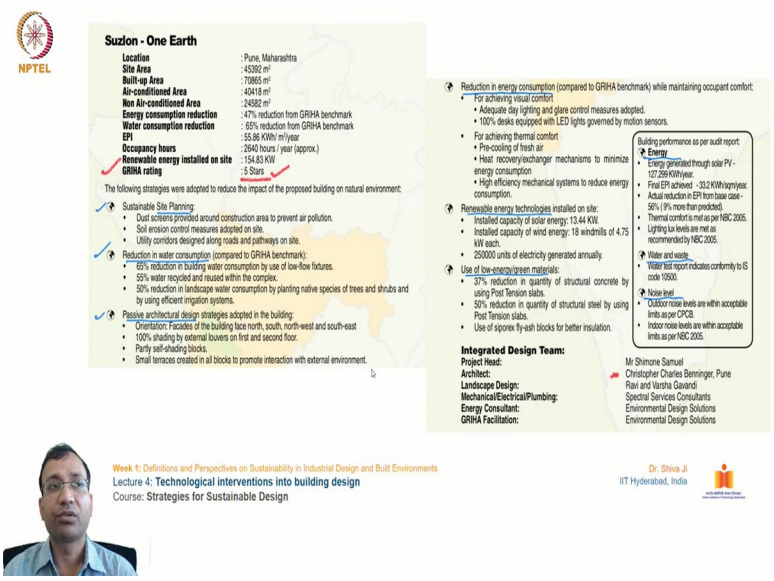

So, some details of this structure we can see over here. So, this is Suzlon One Earth building situated in Pune, and this is one of the Griha five star rated projects, which is one of the role models of the corporate. So, some features like in the sustainable like site planning, he has used dust screens to provide to prevent the dust to spread to the outside, like in the vicinity.

So while construction only, they utilized several means and methods to prevent on the disturbance in the vicinity in the locality. They took care of the soil erosion. They utilized the utility corridors to take up heavy vehicles and the utensils and equipment et cetera in order to minimize, you know impact to the local people.

The next point talks about reduction in water consumption. In comparison to the Griha benchmark, they have achieved 65 percent reduction in the building water consumption by using a low flow fixtures, fixtures and 55 percent water recycled and reused within the complex. They have achieved a 50 percent reduction in landscape water consumption by planting native vegetation, species of trees and shrubs.

And they have utilized the efficient irrigation system also to minimize the water consumption. So, it is highly recommended because some parts of the like India and miserly into Maharashtra and Rajasthan and Telangana and Andhra Pradesh and even Tamil Nadu. So, these states are falling into scarcity of water in recent times.

Next strategy, you can see they have utilized the designers have utilized the passive architectural designs and strategic systems. So, by orienting the facades of the buildings to the north, south and northeast and southeast, they have minimized the heat load on the building and 100 percent shedding by external louvers on the first and second floor.

So, they have utilized these louvers, which are traditional features in our vernacular architecture, which we just saw in the previous slide of the Gujrat. They utilize partly self-shedding blocks. So, that the one block can shed, can become a shed to the next one and that is why minimizing head load. The next feature, what they utilize is the small Terrace's created in all blocks to promote interaction and external environment.

So, that is where this social interaction and overall social sense of sustainability comes into picture. So, involving in and promoting the social interaction among the inhabitants. The next strategy what they utilize is the reduction in the energy consumption. So, compared with the Griha benchmark they have achieved quite a much efficiency in terms of like equipment in the lighting and running there like other sensor kind of requirement.

So, these are equipment's. They have been like taken care of and they have taken care of adequate day lighting to provide and control the glare so that there is no excess of sunlight in the inner areas. And they have achieved the thermal comfort also by pre-cooling the fresh air they have used heat recovery system and heat exchanger systems to minimize the heat losses, to minimize the energy losses.

They have used, like high efficiency mechanical systems to reduce the energy consumption. And the renewable energy technology they have installed, solar generation plant of 13.44 kilowatt on site itself and they are meeting, their energy requirements. They have even installed like 18 windmills or 4.75 kilowatt each.

So, they are generating 2 lakh 50 thousand units of electricity annually. Further, they have used a strategy of low energy and green materials, so 37 percent reduction in quality in the quantity of structural concrete by using post tension slabs they have utilized and 50 percent of the reduction they have achieved in quantity of structural steel by using post tensions slabs. And they have used Siporex fly ash blocks for better insulation.

So, these ACC blocks are coming aerated concrete, cement. So, these blocks are in the trend these days. They work as a highly insulating construction material compared to the traditional burnt bricks. So, on the energy saving part, if you see they have become chiropractor self-

sufficient so there and they have reduced water consumption, they have reduced waste generation, they have reduced noise level.

So, in an overall sense, it is one of the most successful designs you can see in this picture, which promotes social integration, which promotes environmental protection, which promotes overall ambiance of this place, which preserves the culture also. So, it is one of the wholesome designs which I thought of like bringing to you. Thank you, everyone!