Strategies for Sustainable Design
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Lecture – 10
Future of Human Habitation Design

Hello everyone, today we will discuss about Future of Human Habitation Design. So, in this context of sustainability issues which are happening across the planet. What is the way out? How to go about it? How to visualize the new habitation format, new habitation structures for the times to come?

So, obviously it looks like the current state of affairs is not going correct. And we may need to three things: re-visualize and re-imagine different kind of living formats, which may take place in the times to come; in the next two hundred years, in the next hundred years. So, how will that be? Let us give it a thought of a wild thought to visualize that.

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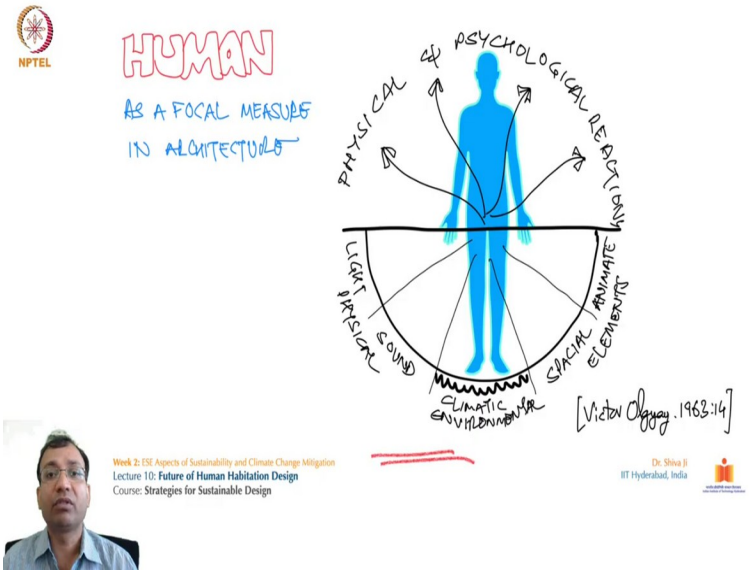

So, if we see the humans, so humans are in the central focal point of the designing as far as like architecture industrial design and planning and everything is concerned. So, human habitation is directly related with the human psychological and human physiological requirements. As you can see in this slide over here, so this is taken from piece of article or research which talks about man as the central measure. So, this was published long back in 1963; but it is still relevant in

terms of visualizing the human needs, visualizing the human comfort level, visualizing the physical surrounding atmosphere, the physical comfort levels, et-cetera.

So, as you can see in the top portion of this sketch this illustration, it talks about human physical and psychological reactions. So, what are those things? How what are those circumstances when we feel like a comfortable physically as well as mentally. So human habitation: a habitation is a place where we spend a maximum amount of our time on everyday basis. And whether it is our housing, whether it is a place of our work, or a place like recreation; they are all part of some types of buildings. So, how to address? How to solve? Because, the major point of even this is talks about human well-being, human welfare, the comfort.

So, how do we going to address this. So, in the lower half of this sketch if you see, there are some physical parameters give up. These are very few layers, several modes in the recent studies which have evolved. So, starting from this topic and this illustration; it has evolved into several minuet details about human habitation and human comfort.

And the bottom one it talks about climatic and environmental issue; this is what precisely we are talking about how to deal with the climate, how to deal with the geography, how to deal with the topography; and how to handle with the external environment and the surrounding and the atmosphere. And there are special animate elements also, how to visualize this space, which can be soothing, which can be comfortable for any human habitation.

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So, let us see this, if you if you see this picture what comes to our mind? I think it's a real picture from. Well, I do not want to the name that place; but this is really weird to see the two starking contrast in the human habitation planning and design and execution. So, on the one side we can see there are like shanties, highly dense populated areas in from that city. Or on the right hand side, we see relatively much better designs with the courtyard planning with the spaces, ample spaces given for transportation, ample spaces given for parking. You know play areas, recreational areas and things like that.

And the every household, every unit of these houses; they have access to outside exterior this is surrounding with the fresh entry of the air and the light, all of these natural requirements. So, with the ever increasing rate of the population, how the design and how the construction sector is going to maintain its balance to provide to meet the needs of every human being.

It is a big question upon us as a designer, as a planner, as an architect; how to deal with this situation. Are these people who are living on the left side, they do not deserve equal treatment? What about the points from the UNSDGs? How to give them equality in the society? How to give them how to share the equity with them? How to share this human well-being with them?

So, is there any input which can come from designer side, come from the architect side, from the planner side. So, let us see some of the visualizations taken up from different visualizers, different artists and designers.

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So, what do they think, what do they say, so about the future. What is being said over here if you see, if we cannot envision the world we would like to live in, we cannot work towards its creation. If we cannot place ourselves it in our imagination, we will not believe it is possible. So, if you see in this statement what is being said over here, if we cannot visualize the future. If we cannot visualize the time, if we cannot visualize the society; what kind of society we want? What kind of living conditions we want, what kind of community living we visualize.

So, unless we visualize that, we cannot execute it. So, first of all it is very important for us to visualize that conceptualize that; then comes the execution part. The second statement it says, we shall require a substantially new manner of thinking if mankind is to survive; this is from Albert Einstein.

So, greatest scientist like him is talking about how we can survive as one single race of humanity, over the times to come. So, we should substantially a new kind of thinking is and a new kind of a systemic approach which is needed. Then only we can plan for that, then we can go for the execution of that scheme; and we can sustain the future.

What are the future scenarios given by Buckminster Fuller; you maybe knowing him. He was one of the greatest architect who has been here; and who has explored several pneumatic forms, geodesic forms several kind of structural lattice systems and things he has developed. So, what he says about the future scenarios, you never change things by fighting the existing reality. To

change something, build a new model that makes the existing model obsolete. So, as rightly said by him, we must need new a proposition a new design, a new landscape, a new architecture to replace the existing one; if we find it did not suitable for the future needs.

So, we have to imagine, we have to visualize that scenario; there is no other way. If we keep on struggling with the present one, it is not going to change much for our realities. The next statement is from Dennis Gabor: the future cannot be predicted, but futures can be invented. Again emphasizing the same thing, we have to invent our future; we have to go behind it, we have to look for it, we have to envision it; then only it can be made possible.

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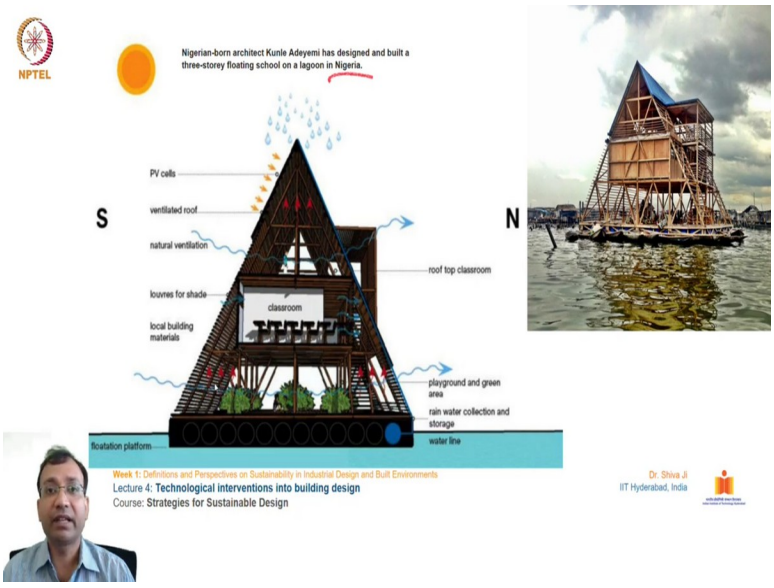

So, one of the example I would like to put up for your understanding here as a case study. This is from a country like Nigeria; so we know what are the relatively conditions in the African countries. But, effort can come from any place, from any corner of the world; and that is why we are precisely keeping this slide from visualization of this it is a school floating on the water. So, this is from the place in Nigeria and it is situated in; it is a Nigerian born architect Kunle Adeyami has designed and built a three-storey floating school on a lagoon in Nigeria.

So, you can see in this picture on the right hand side, it is a three-storey wooden structure; which is floating right on the water. And there are kids the children who can come here, they can enjoy the view, they can enjoy this is structure this design; and they can learn in this kind of environment.

So, a building need not be always fixed on the ground; so actually the idea along with this design is to move away from the rigidity of the conventional design. And think really afresh; because in the new context which is upon us upon the humanity; like the pollution in the several quarters of the places like earth, land, water, air.

Then how can we deal with it? Where, where we have to place ourselves to minimize the consumption of the material to maximize the renewable sources consumption in our everyday life. So, how we can design in these renewed context? If we want to move away from the controlled environments like electricity based appliances based environments. Where we have controlled electrical based lighting, we have HVAC based conditioning systems and all that. So, how can we move away from such scenario; so this design presents a very fresh visualization. And you can see he has a cubed this unit with the units like photovoltaic cell, panels.

And there is ventilated roofing for looking for better ventilation inside; and it is relatively much open than any conventional classroom. And it has louvers for shade also, so that the direct sunlight can be avoided. And it has some amount of vegetation also on board, where children can feel that not they are not too far away from any place such as ground. And it is comfortably sitting on the water body floating.

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So, you can see this picture over here and how amazingly beautiful it looks. So, see very simple earthen materials along with the tin roofing which is used over here; and children are reaching

there with the smaller boats. So, how fascinating is this to learn in such kind of environment. So, this design gives us a fresh outlook how we can think about in the renewed scenario; and we must actually strive for that. So, let us see some more examples and discussions in the coming slides.

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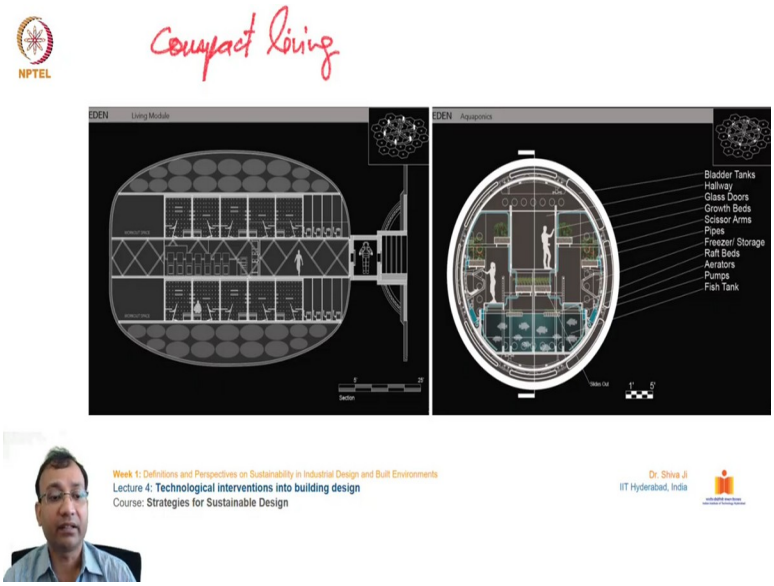

So, here if you see we have the humanity has always begun with the space h. So, and some of us from our human race, they have been constantly living in ISS International Space Station for quite some time now. I think ISS is almost completing twenty years this month. So, in the year I think twenty years ago, in the year 2000 and in the month of October or November it was launched. So, it has already completed twenty years and it is again projected to stay afloat for another six to eight years at least. So, this is ISS is not a permanent colony or something like that.

But, at least ISS provides a step ahead in the future habitation of the mankind; where if we will be exploring our habitation systems in the space. Why I am discussing this topic over here? It is very important to visualize and imagine things; because imagination creates generates the knowledge.

Because, Albert Einstein he has rightly pointed out in one of his statements, imagination is more important than knowledge; and as a designer as a creative people. We have all the liberty to

visualize to foresee those things, how those things are going to come our way. And how better manner in us which better manner we can cope up with them.

So, it is very important for us to at least keep thinking about these strategies, these phenomenas to how in the given renewed like scenarios or circumstances of the atmosphere; how we are going to survive. So, in this capsule if you see it, it is an arrangement of several things, how to grow their food in this habitation system.

How to harvest energy? How to generate energy? How to work? How to live and how to dispose of the wastes? So all of the cycles of any like requirement any fulfilling needs; they are all being carried out in this design. So, if you see on the right hand side sketch on the right side, so it has a bladder tanks, it has hallways, it has glass doors, growth beds.

So, growth beds are the places where there will be like vegetation and eating material; the food will be grown. And there are pipes for servicing; there are freezer and storages systems also to keeping stuff for a secure manner for a longer period of time. There are raft beds where there will be water bodies will be kept and to provide oxygen into them.

There will be aerators and pumps and fish tanks also; because fish are the one very important part in the recycling and this stuff. So as long as they provide like food, so that is a very normal this thing; but, they actually take care of the decomposition of the several types of organic waste materials also.

So, they are one of the best recyclers of the organic waste material in the ecosystems; so how such waste from kitchen and other agricultural wastes can be recycled on site itself. As at the same time they will be provided with the nourishment and the nutrition; so it is a complete cycle where it has been visualize to be undertaken in this capsule.

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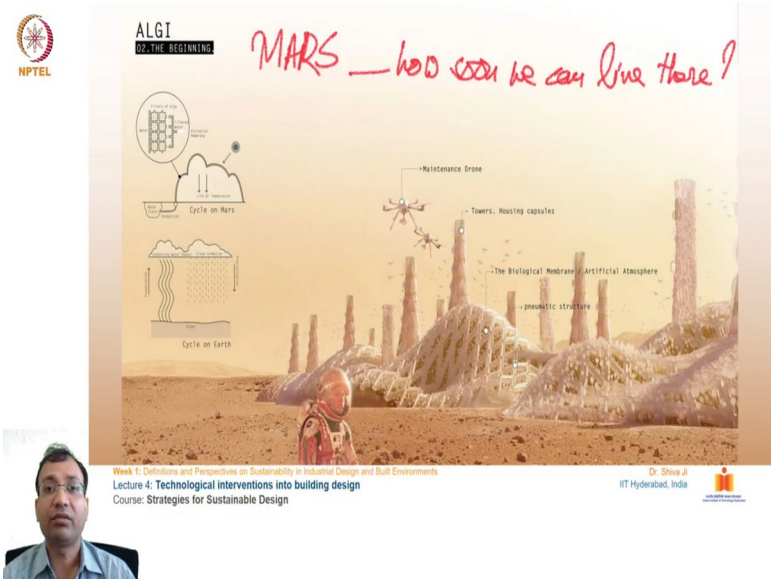

We have been fancying for quite sometime to settle on the mars; how soon it can be possible for us to move to mars. It is it still matter of concern for us and everybody is excited to to at least plan for it; at least to see things how things are shaping up. And recently there was one movie also which depicted such conditions, how the protagonist in that movie manage to grow his food there and he managed to survive for an extended period of time. And though he came back to the earth, but at least the period while he stayed over there was really challenging; and it was an eye-opener for us to see the human endeavor how to survive in such harsh conditions.

Beyond earth there are limitless possibilities as a creating human settlements on the various planets and the satellites. But, how will that thing be made possible; it is still a fancy imagination, and very strong working out details. As you can see in this illustration over here, it talks about creating artificial atmosphere; because mars does not have the normal atmosphere what we have here on the earth. And for doing so it it creates pneumatic structures, and within those pneumatic structures, a human habitation along with the plentiful saturated oxygen and other gases can be provided.

And these shells, these artificially created atmospheres will be able to nourish the even the vegetation. And there are other, there will be some other supporting activities also as you can see in this picture; maintenance drone and all to keep check of the maintenance part of it. And so at the left hand side bottom you can see there is the cycle of water, which happens usually on earth

is shown with that sketch. And on top there is cycle which is being imagine how this thing the same water cycle can be emulated, in an controlled atmospheric membrane and the volume on the planet mars. So, still we can visualize things and I am sure there are scientists and engineers working out to detail this how the human habitation will look like on the planet mars.

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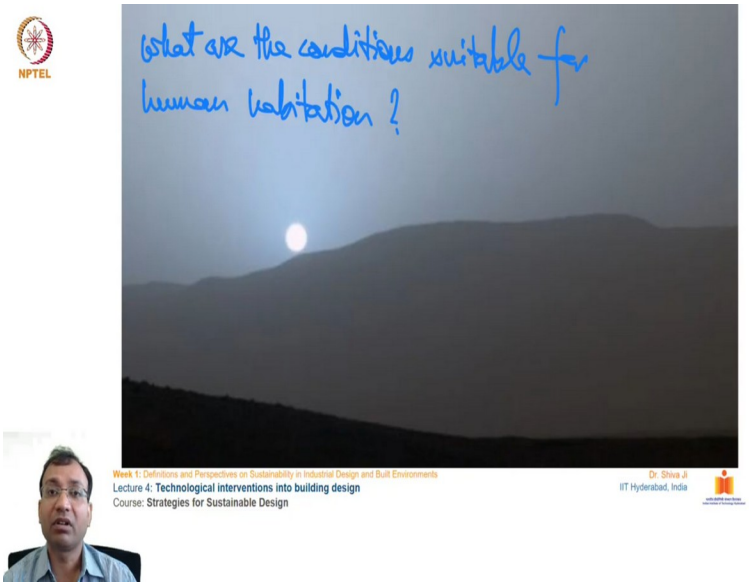

So, one major variation is what are those conditions which have supported life on earth? So, before thinking of settling on any other planet or any other satellite elsewhere beyond our planet earth; we must understand what are those fragile the set of circumstances who have met coincidently on the planet earth. And have created this a fortunate moment, where the life has become possible. For example, the supply of oxygen from the supply, for the, for an example, the optimum distance between our star, sun and the planet earth. So, that we get the optimum amount of heat and light not too little, not too high; and the quantum of the atmospheric pressure.

The presence of life giving gases such as methane is suppose to be one of the very important gases, which had starting microbial life on this planet very long ago billions of years ago. So, how these compositions of different natural elements and composition has helped; for example ozone we are all aware of.

So, in an absence of ozone, there will be shower of ultra violet rays on this surface of the planet earth. And we may not be able to cope up with the ultra violet this. So, how fragile these smaller smaller things are, which we generally take them for granted. So, how we can make use of these

resources which are very critical for supporting life on this planet; which we are thinking to emulate elsewhere.

But, I am not sure how long it may take for us to create habitation systems on those places. So, we before going on to those alien places, we must preserve our own planet which is sustaining us for a very long time. And which is going to sustain us and it give us shelter, give us food, give us all the necessities like resources for a very long time to come.

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Space is another domain, so I was speaking about ISS; this is actually visualization of ISS; so, International Space Station. So, this is laboratory space where scientists and engineers are conducting several researches; so those researches include even related with the human habitation like how well be able to grow plants, for food supplies in space. How well this micro gravity is going to affect the growth and development of our human body; how our these muscles are going to have in an space, where there is no gravity almost no gravity, or very little gravity.

So, how our bone system is going to behave; because our anthropological development on this earth has been, has been in such a way that for that we require one G of earth. We require such atmospheric pressure, we require this amount like humidity; we require certain wind ventilation. We require this sunlight, we require this heat; so all of these compositions of these different elements; they immediately get vary. The moment we reach into the space, there is no gravity or very little gravity in a micro form; there is no air, there is no surface earth surface to stand on,

there is no naturally occurring water over there. So, how this whole human habitation thing will take place is still under explorations.

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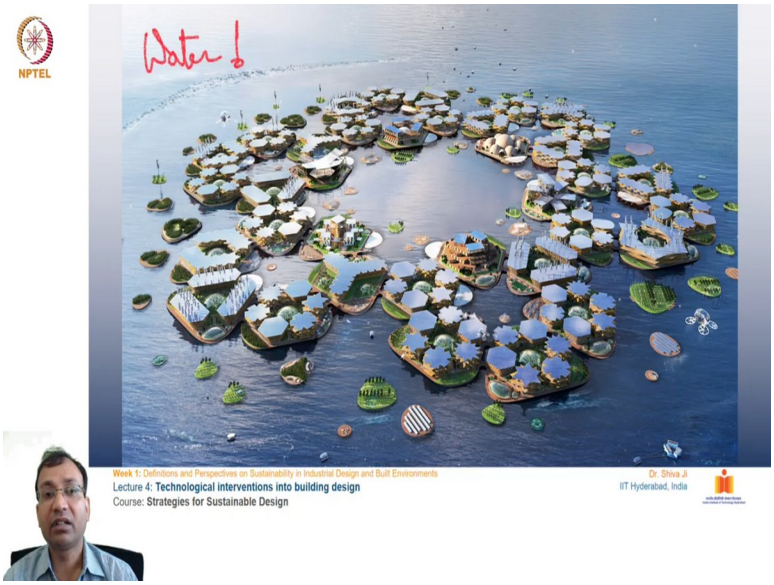

Another domain where this is this looks possible for human habitation, is on the surface of water. So, surface of water gives us a dynamic platform, where our structures cannot be hinged permanently to the ground; or cannot be penetrated in the ground to create with the help of foundation structure and all.

But, they can be floating depending upon the requirement depending upon the weather and climate. We can move our these settlements from one place to another; we can keep growing our food aqua with the help of aquaponics and all, for the food supplies, for maintaining then the marine life, maintaining like oxygen supplies. So, this another probable domain looks likes is the water surface.

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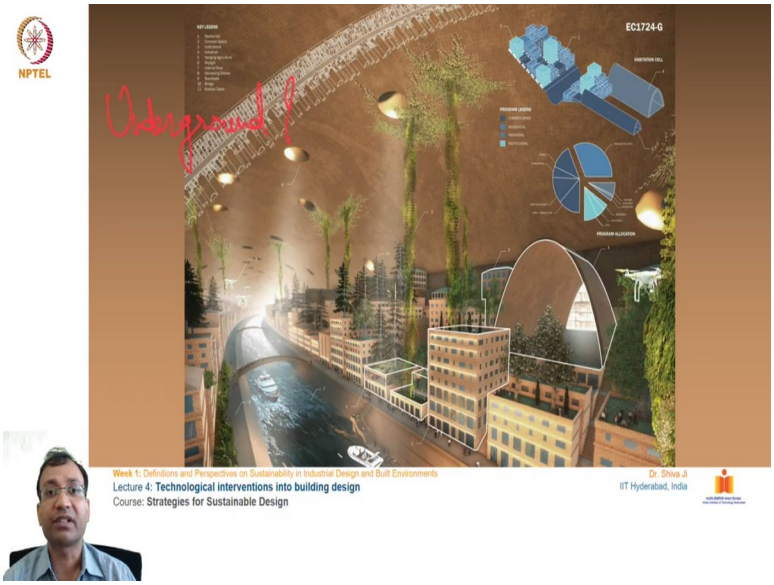

And next to that even the surface below the ground or the earth surface. So, the ground right below the earth surface also is one possible domain, where human habitation might take place. We have some traditional examples of living in the earthen structures from ancient places like Turkey and some places.

So, we have seen bigger like stone mountains hillocks converted into finer boroughs, where the human settlements were designed to for living. Even they use to keep some domestic animals and cattles also in those chambers at the lower levels. And it used to be naturally ventilated with air pressure, and they use to collect water from natural supplies rain water and things; and they use to live in those boroughs for very long time.

So, we have those examples is it possible. Is it feasible that such imagination, the piece of imagination we are going to realize some day; because it might happen? As the global warming is increasing with the every decade with such scale; so it may become possible one day that the temperature on the earth surface may increase very high. And it may actually render the earth surface into a very deserty kind of space. So, we have seen some picture from the planet mars; so how the mars has converted into very dry arid and very tough to survive surface. In the daytime the temperature reaches up to 250 degrees, and the night time it reaches up to minus 150 degrees.

So, that is very inhospitable for any human being or any living creature for whom no here on the planet earth, to survive on those extreme conditions. Though it may have, though it may take

very long time for earth to reach those condition and I will never pray for those conditions god forbid.

We maintain we learn how to maintain the balance, the ecological balance on our planet earth, and we continue to live here comfortably. But, just for the imagination sake how this thing is going to look like; so as you can see in this visualization this illustration. So, there will be streams, water streams also created, and there will be full air supplies.

There will be chimneys or the air vent systems too to take and exhume air, stale air from the lower portion from to the atmospheric above. And the vegetation with the help of trees and other greening creepers and things; this will be completely laid with. And the whole city might be constructed in the times to come as it looks like.

So, it is not that difficult, it is not that impractical; there are some in the urban scenarios. There are some building who have taken advantage of the earth's topography to hide below the earth surface. So, they have used; for example you may have seen, you may have been to the Mahatma Gandhi's memorial place that Raj Gat in New Delhi.

So, there the architect had utilized the contour the earth form of the landscape; and they have actually taken a sunken area in the middle of that landscape. And they have created that space where the Mahatma Gandhi's ashes were buried. So, if you see from if you are entering that area that complex, so will not notice any manmade structure; but, you will see all green grass surfaces, rising undulating grass surfaces.

So, is it possible that such topographical features can be utilized for creating human colonies, human settlements in the times to come? Because it is completely possible. Utilizing like we have studied in the previous lectures; how to utilize the form? How to utilize the orientation after building to take the maximum advantage of sun, wind direction and rains?

So, to make them more efficient and working, we must align all of these natural elements in such a way, so that they can take maximum advantage of that. So, this completely looks plausible maybe you can explore more with your imagination. How our building services, how the civics services, how these transportation services can take place below the earth surface. So, this I am leaving as an assignment to you; maybe you can put your creative thoughts into it.

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So, so as a submission to this lecture, I would suggest all of you to be visualize most fitting solutions, which helps this ecosystem to maintain its balance; which helps this biosphere maintain its balance. Which is almost no polluting entity, which consumes renewable resources only, which does not exerts toxin and affluent materials, which utilizes the natures resources in an responsibly way, which behaves in such a way to promote harmony and value system in the society; which enables every member of the society and the community to live in a happy and well-being kind of situation.

So, you are free to visualize and propose your design solution and share on the various platforms; so that it can come into the attention of the future planners and designers and architects. And this can be taken forward for the future for our humanity, human habitation. Thank you all.