Sustainable Architecture
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Lecture – 47
Vernacular Architecture-II

Welcome to the 2nd lecture where we are discussing about Vernacular Architecture and Sustainability as part of this ongoing online course on Sustainable Architecture. So, in the previous lecture we were looking at various examples from our country and also from across the world and we will be continuing discussing some more examples in today's lecture and towards the end of it we would try to conclude our discussion on traditional architecture vernacular architecture and sustainability.

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So, the next example which I have taken is that of a Toda hut from Southern India and if we look at the different designs of huts which are found in different parts of a Southern India. We can see the identity which is coming from the design and the design is a response to the climatic requirement, climatic variation in which these huts are set, while the raw material remains the same.

So, the raw material which is used for these huts is largely the weeds, the material which is used for thatch. However, depending upon the amount of rain to which these huts are

subjected to, also the amount of earth, mud and stone which is available, wood which is available in the vicinity which can be used to construct these buildings the design has varied, while all other responses remain the same as that of making a thatch out of it.

In fact, using the thatch to make the entire hut so, the uniqueness of these designs is what make them more sustainable as compared to the green buildings today. So, that is where this difference between the green building and sustainable building sets in, where sustainable building is something which is owned by people which belongs to people, which bears the identity which connects to the social values, the culture tradition of a place and not just environmentally responsible.

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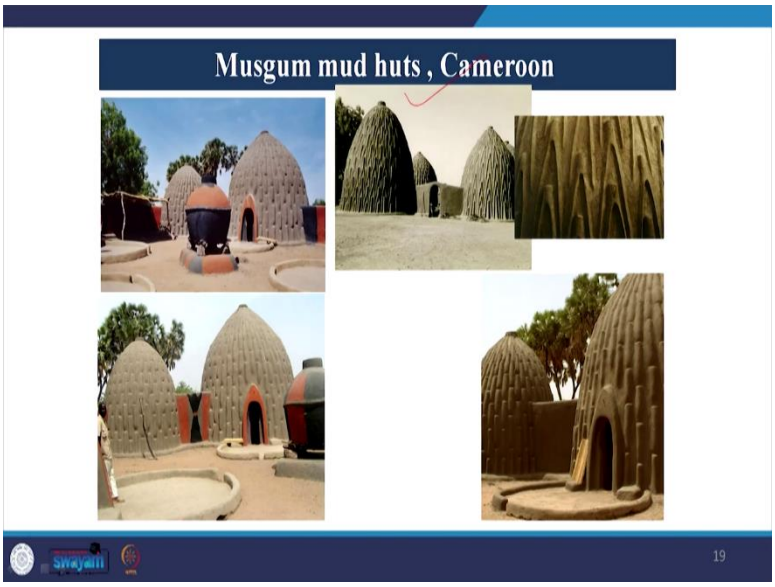

Another very interesting example is that of Musgum mud huts from Cameroon. So, these huts are made, one that the geographic reference and the context of this these huts is an absolute desert. So, these huts are set in desert where there is hardly any availability of rain, but the desert does not have only sandy soil there is mud available and this mud is largely brought from the termitaries. So, the huge termitaries where the termites live the termites, termite hills have the mud which is used for making these huts.

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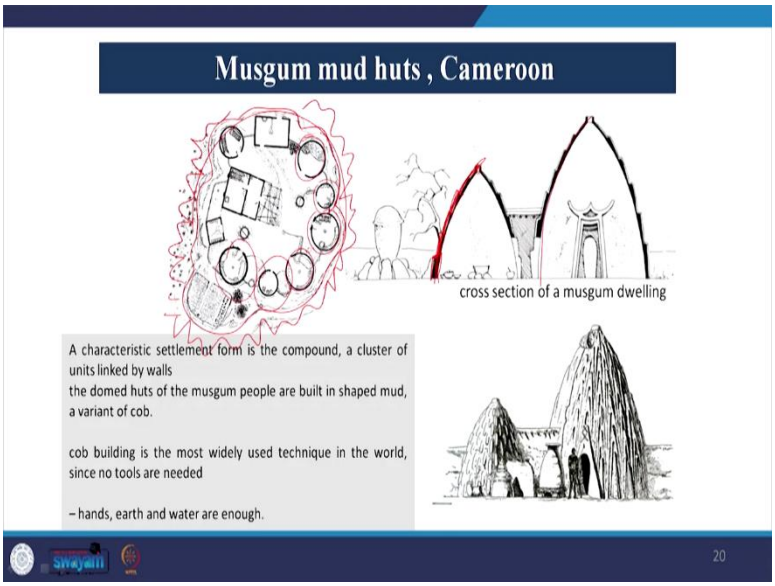

So, what they this people do is, if you look at the design of these huts it is quite similar to some of the huts which we have just seen which are made out of thatch also the plan. So, to optimize the amount of resource the plan is circular which is the most optimized shape. So, minimum surface area which is what was required we have seen Bhoongas also doing the same.

Now, here there was no thatch, the walls could not be taken straight and then covered with thatch because there was no weeds, there was no material available to cover it with a thatch and hence the resultant is this shape. So, in the base it is thicker so, the hut is made in parts, smaller parts of mud subsequently and it goes up to the top where it becomes very thin. So, from bottom till the top the thickness is gradually decreasing.

Another very interesting feature of this construction is that the material which is used which is mud procured out of the termitaries, the gum, the glue like substance which is released by termites is also mixed within the building material and that provides it a waterproof layer on the top of it. So, even when it rains mildly these huts are not damaged by the moisture, these are not damaged by the rains. Because they have become almost waterproof from the top. And just like Bhoongas every subsequent years the community paints another coat on top which adds that layer and maintains it as a waterproof building.

So, in addition to these individual buildings since community since resources are so limited, the resources are shared people share those resources they also share the land, they also share the challenges and problems. So, just like as we have seen in the communities of Bhoongas there is a boundary wall on the sides of these huts these mud huts in Cameroon and these mud hurts they keep the sand at bay. They keep all the sand and dust which accumulates comes with the flowing breeze wind and it keeps them out. So, that the inside of this community remains dust free.

So, these small huts are arranged towards the periphery, the there is a common granary the grain store which is used by the community it may often be a large family or joint family of sorts. So, they use common store for storing the grains, they commonly cook together because the fuel; the fuel wood is also very very limited. So, the design of not just individual building, but the community is in such a manner that the resource consumption is optimized, it is minimized rather not just optimized.

So, it is respecting the tradition and culture of the people, it is respecting the environment around us and of course, the optimize consumption of resources makes it out and out economical.

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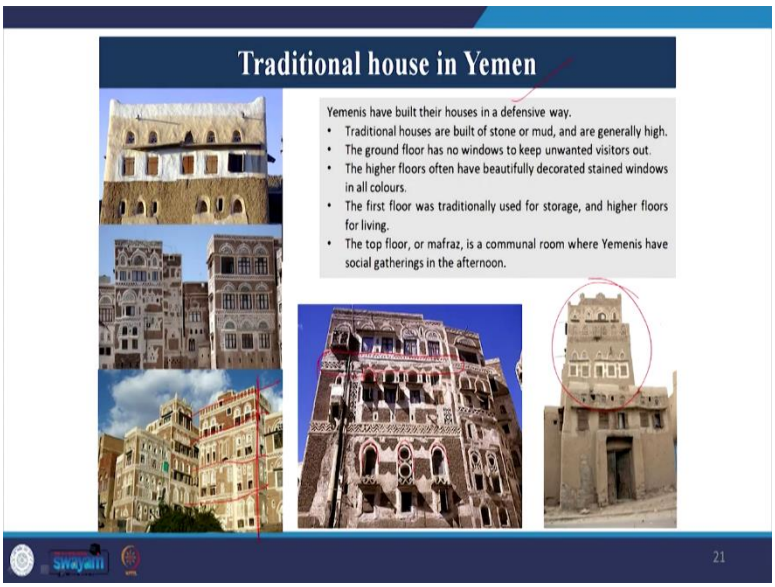

Another very beautiful example I have here is the traditional houses of Yemen. Now the material which is used is largely mud or stone. So, stone is very commonly available; however, wood is not. So, what we were seeing in Turkey in the Sirince village house is

we saw that stone and wood has been used to construct these houses, here these houses are made entirely out of stone and mud.

And the unique architecture architectural identity the vocabulary which is imparted to these buildings is out of this ornamentation and also the arches of these windows. So, all the windows have these arches, because there was no wood to span the windows.

So, the stone arch is constructed here and this stone arch is something which also gives it a unique character added on top of it is this white ornamentation out of lime. So, besides the architectural identity and also the material resources which are consumed also the design, here we can see that the material was capable because the house was constructed in stone and mud. So, mud was used as a mortar, lime was also available which has a strong binding capacity. So, the height of the houses we can see that it has increased. So, instead of one or two stories we can see that this construction has often has 4 stories or even more.

However, the identity remains the same whether it is a small house like this or a big house like this the identity remains the same. Another thing that this is a compact house this is a climatic requirement as well as the requirement of the society. So, the compactness of the house is responding to both the physiological requirement and also the social requirement, the socio cultural requirement.

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Hence again we see that this example is a beautiful example of sustainable vernacular architecture. So, gradually instead of calling these the examples of vernacular architecture, I am now calling them examples of sustainable vernacular architecture because that is what we have been seeing, that all the examples of this vernacular architecture are out and out examples of sustainability, sustainable architecture.

So, the next one that we have here is cruck framing, which is found in most part of Britain and some part of Europe other parts of Europe as well. Now, the material which was available was that of largely is that of wood and the shape which they derive is out of the shape of the main trunk of the tree So, the main trunk of the tree was used as the main frame which is the cruck frame and this shape is the commonly available shape of that of the Christmas tree. So, it is slightly bent and this was the easiest thing to do to put two frames together notch them on the top and add rest of the frame on top of this main cruck frame.

So, the main material which was used for framing was wood and on top of that other materials. For example, wherever there was availability of stone, stone was used, where there was no availability of stone brick was also used, where brick was also not available even wood has been used to cover the walls to make the screens. So, again responding to the local context and also the climate, because the plan if we see is compact. So, that the surface area has been reduced and the heating which is.

So, since this is extremely cold climate heating is used and because of the reason to contain the heat inside the building the window sizes have been reduced. So, unlike the buildings on hills where almost the entire facade on the sun facing side used to be having huge wide open windows, the windows here are quite limited in size.

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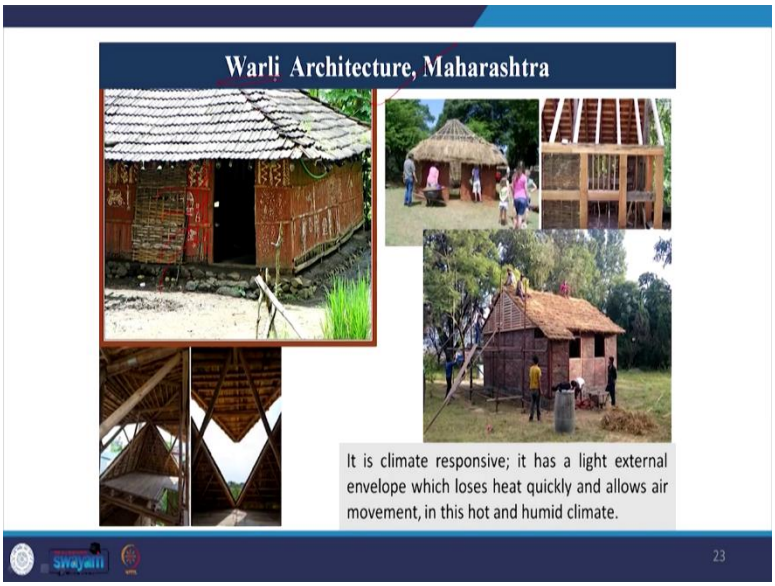

Next we have a very beautiful example which is Warli architecture from Maharashtra, again these buildings were in a climate which would receive a lot of heavy rains. The climate is warm and humid which requires a lot of ventilation and so, we see the response the walls are made out of weed screens. So, these are all perforated walls which allow the air flow through them.

On top they have been painted they have been applied a coat of mud on which to impart that identity, Warli art was done. So, women would often paint their houses in typical designs which is now identified known as Warli. So, every hut would be different yet it bears the same identity, socio cultural identity, it responds to the climate, it responds to the people.

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So, we can see these typical designs coming up and again like most of the temporary architecture the Kaccha architecture that we have been seeing, it gets repainted on top every subsequent year after the rains. So, mud and cow dung is applied to the walls after regular intervals at least once a year and the walls are painted and repainted again. So, it only strengthens the wall.

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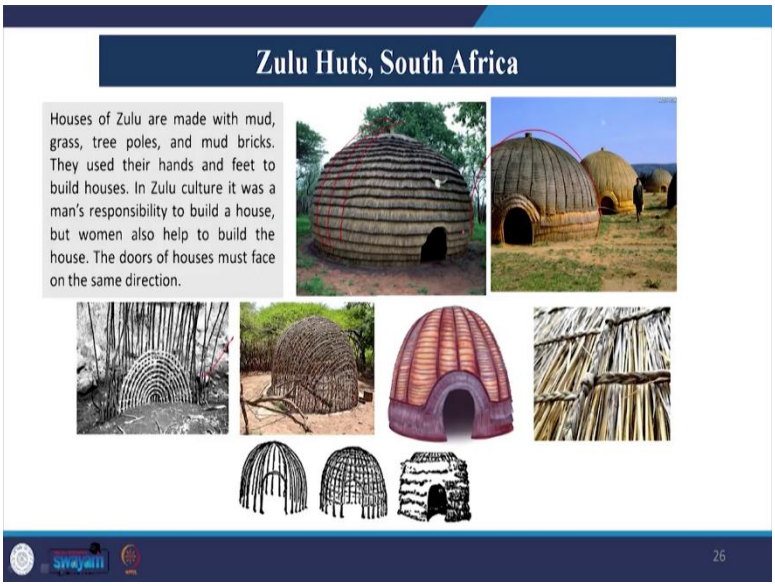

This is another example this is of Zulu huts in South Africa and if you can remember one of the Toda huts from Southern India is in design very similar to this. So, here there are

very less trees available. So, trees are not commonly available while bamboo is there and there is a lot of weed which is available which has been used to cover the hut as a thatch.

So, instead of using wood for taking the straight walls up the thatch itself has been used to make the hut similar to the Toda hut. So, the response is similar, but the design is not identical, again we see that identity of this place coming into picture a different design a beautiful design, but exactly the same use of materials because of the material availability.

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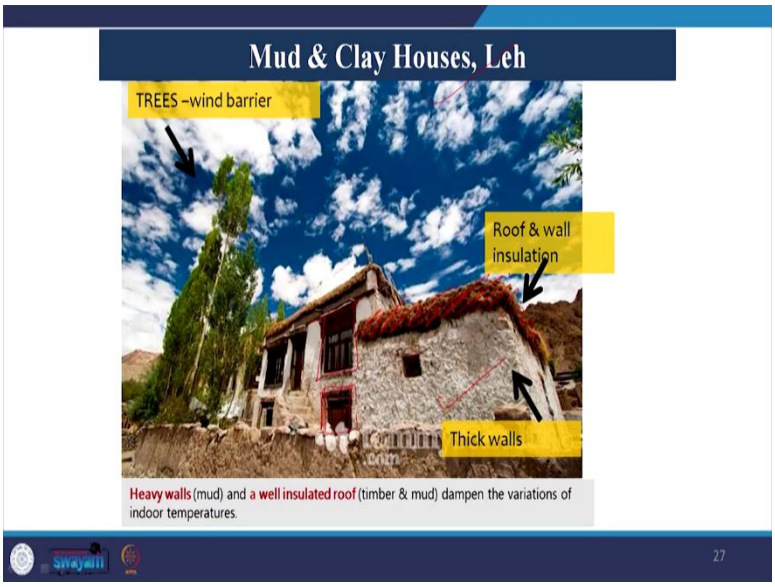

Next is mud and clay houses in Leh, Ladakh, here the resource which is available is mud and thatch, the grass is available, but there is very less amount of wood which is available which is what we see in the architecture again.

So, it is extremely cold climate it snows for almost half of the year, but it receives very small amount of precipitation. So, it snows, but very rarely there is hardly any rain, but it gets extremely cold sub 0 temperatures. The response to that is in terms of this architecture where we see the mud has been used to create thick walls which provides the insulation. The roof has been made out of wooden beams and on top of that using this grass which is weed and mud, a flat roof has been created which is to receive a lot of sun as much sun as possible.

The windows in the sun facing side have been created, have been designed to be huge while on the rest of the sides they have been minimized. So, there are very small openings

on the rest of the sides while the sun facing side is often huge windows. Also the thatch which we see here is not on the entire roof the rest of the roof is actually flat roof and this thatch is only on the boundaries which provided the strengthening, it gives the strength to the roof.

And also this flat roof is used to dry up the thatch, because the dried grass is used in winters as fuel for cooking and also for animals as fodder. So, in during summers the entire roof would be covered with grass freshly cut grass which will keep drying through the season of summer and then it will be stored in the winter inside the house. So, again we see a beautiful response in terms of architecture to the physiological requirements of the place the climate of the place.

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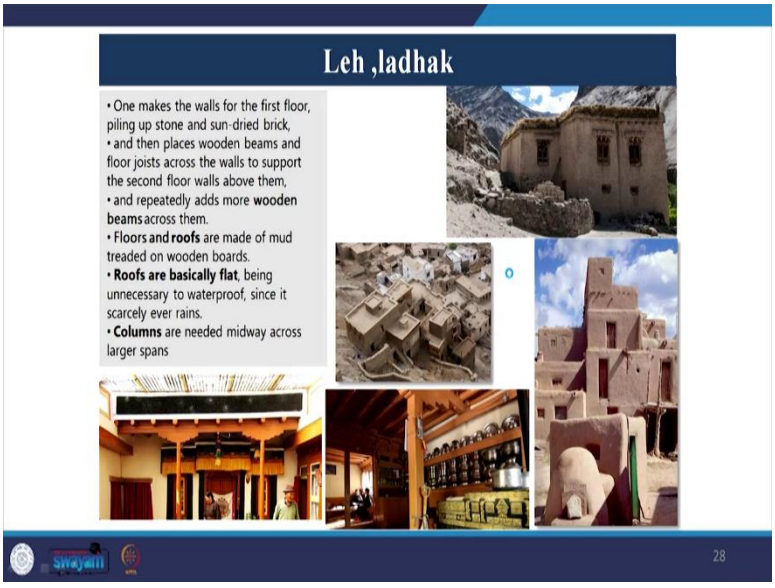

And here it is not very evident but if you see more houses from Leh and Ladakh you can see the impact of Buddhism which is the religion commonly followed on the design of these houses. So, the elements small elements there be a typical trademark of Buddhism the kind of flags they use the colors the beams and all of these.

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So, couple of more as we can see here are one is Igloo from Antartica. So, the only resource which they have available is snow, ice and that is what people have used to create their huts, again the response is circular domical kind of structure which is consuming least amount of resource and gives least surface area to volume ratio.

Another region from Turkey not the same as Sirince village, but this is a place which is very close to the high altitude hills mountains and here we see that only stone has been used. So, thick walls have been used unlike what we saw in Sirince village from the same country. This is log hut from Valley Forge where wood is abundantly available and the way wood and mud has been used to span and also to cover the walls is unique.

This is an another one which is in the middle portion of the Turkey again we can see the use of stone, but absolutely a different identity coming from the same country, but three different responses.

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We can see one of the Trullo houses from Italy where we again see the abundance of stone is put to use. Look at this beautiful house from Japan where wood is the commonly used available material, Japan being a country which is small and also limited amount of resources are available, rapidly renewable material has been used. So, bamboo is the construction material for most of the traditional constructions in Japan. In Nepal again we can see the availability of clay and stone and the same being used in the houses while the thatch is typical. So, this is again the response to the available resources and also the requirement of people.

So, if I have to conclude from all these examples these discussions that we have been having for the past 2 days. We can conclude very clearly that the traditional architecture and sustainable architecture they sound quite synonymous, because both of these they respond to the environment they respond to the people, the society, culture. And since they optimize the use of resources, they use minimal amount of resources that is why they prove to be economically sustainable as well.

So, bringing a material which is not local and then bringing it from outside using in it in your residences would have definitely proved to be costlier more economically intensive as compared to the responses which we have seen. And this is what we realized the scientists the contemporary architects and planners they realize that traditional communities, people have mastered the art of architecture, mastered the art of designing

these buildings and not just the art of it, but the science of it as well and that is why sustainable architecture and the modern day examples are drawing a lot of lessons from traditional architecture.

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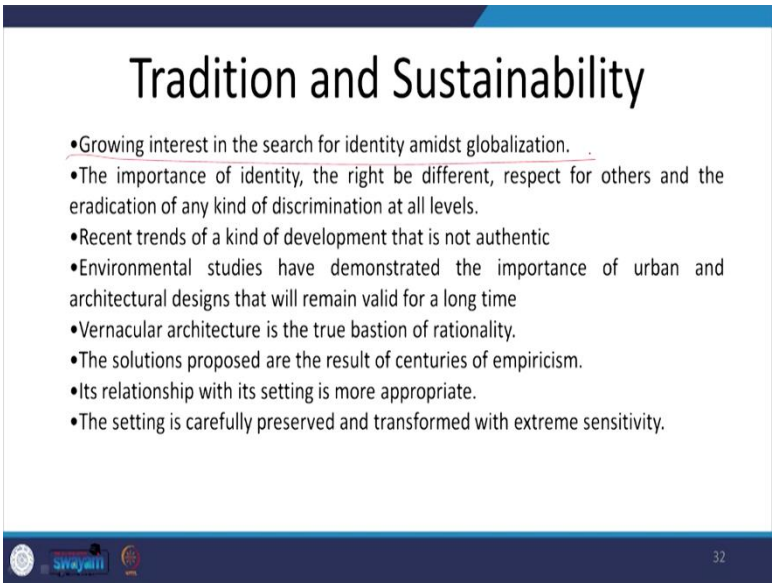

And because of that there is a growing interest in the search of identity amidst globalization. People realize that we can create sustainable architecture, we can create green buildings, but the moment we impart an identity to it, it becomes sustainable because people start owning it, people start relating to it. And that is why there is also growing research in traditional architecture and connecting it with sustainable architecture. So, from this discussion we can very clearly identify that the architecture, sustainable architecture has to be context specific.

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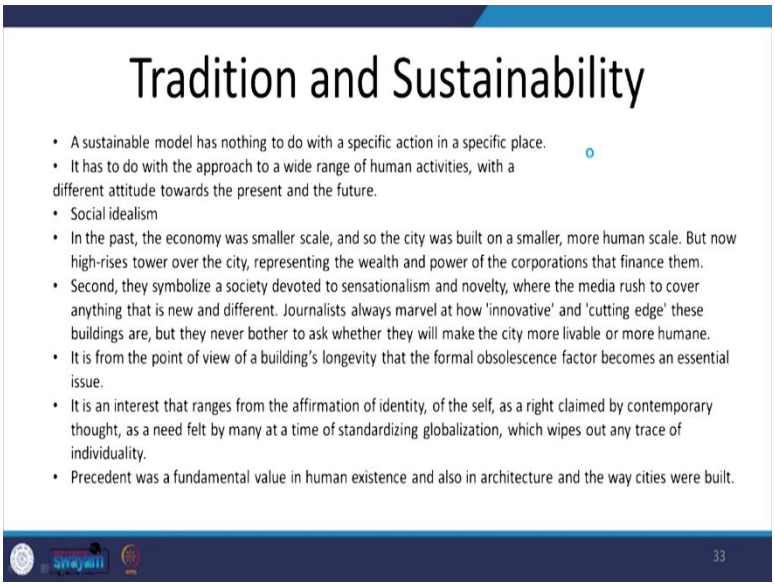

It has to be for the place, it has to respond to the needs of the people, the culture, the traditions of the people and hence sustainable architecture across the world cannot be the same response, we cannot say that a building which is sustainable here would be sustainable there. It has to change with context it has to change with the people and hence our responses should be very-very different.

So, I will conclude this discussion on vernacular architecture and sustainable architecture here. See you again with the next lecture where we will be discussing about couple of more topics related to sustainable architecture before we move on to study the whole building simulation tools as part of this course.

Thank you; thank you for being with us.