

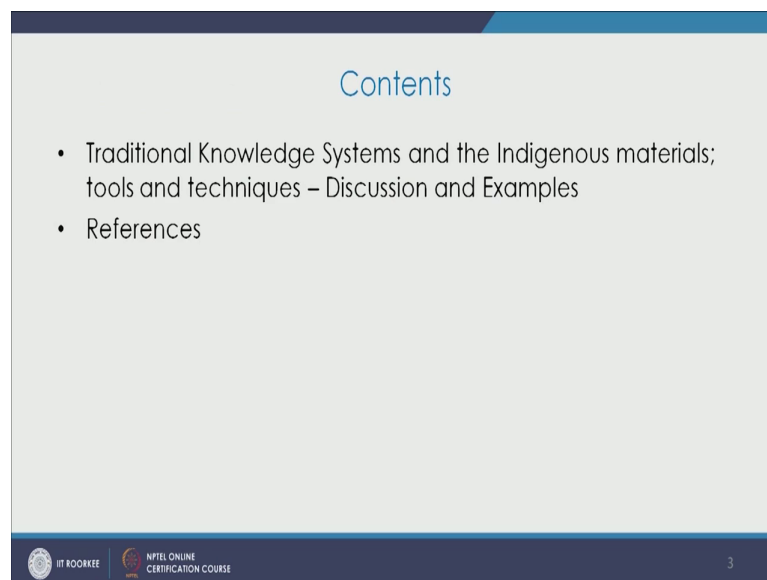
Role of Craft & Technology in Interior-Architecture
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Lecture - 09

Traditional Knowledge Systems and the Indigenous materials; tools and techniques

Namaste! Hello everyone, welcome to the NPTEL course Role of Craft and Technology in Interior Architecture. Today we are going to discuss module 9. So, in the module 9 we are going to talk about the Traditional Knowledge Systems and the Indigenous materials tools and techniques.

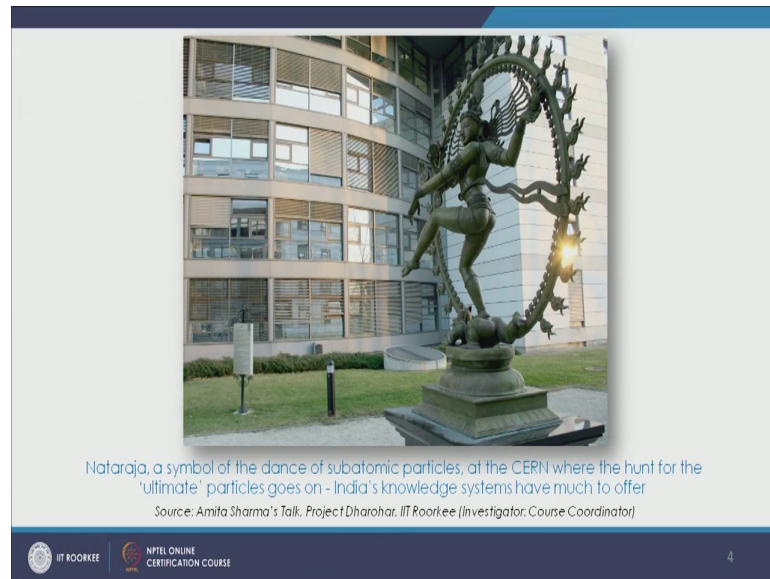
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In the previous modules, we have already seen you know what traditional knowledge systems mean what are the varied perspectives on that, what are varied subjects or contexts in which we discuss traditional knowledge systems. And we also discuss the bit about materials, tools, techniques and interior architecture, skills and craft persons.

So, we are trying to understand here traditional knowledge systems and indigenous materials tools and techniques through certain examples and discussion that will be generated along with that, and towards the end will also see references. Now, I want to begin with this very powerful image.

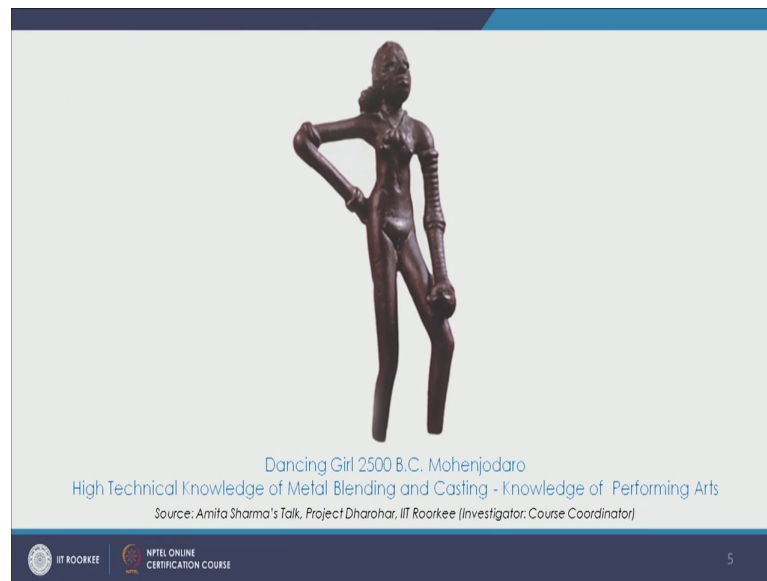
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So, this is the CERN building and we see the statue of Nataraj next to it and it was very very beautiful and pleasant to see this Nataraj statue there. Now, we know that CERN is a very famous organisation and place where the hunt for the ultimate particle goes on and Nataraj itself is also the embodiment of the dance of sub atomic particles.

So, Indian traditional knowledge systems have so much to offer and so much to give to the entire world so this juxtaposition here really explains the power of a traditional knowledge systems and the spread it has achieved across the world.

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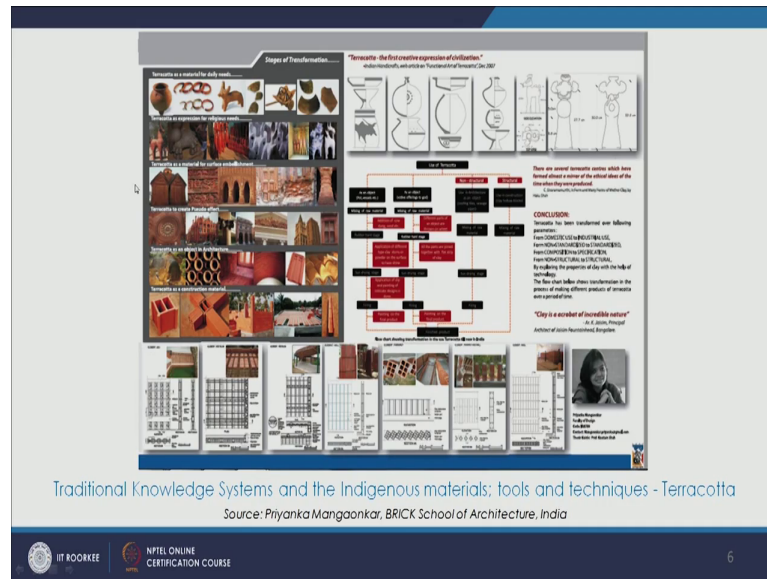


This is the very famous statue of dancing girl from Mohenjodaro, and 2500 BC it is a very thousand years old statue, and when it was excavated and studied it reflects completely you know the knowledge of metal blending, casting what were the techniques in those times thousands of years ago. We were equipped with such knowledge when you about the materials, that the metals exist and how the casting could be done.

Plus it also reveals about the knowledge of performing arts and how the society was. So, this is again here a testimony of the traditional knowledge systems of India, and how throughout the history they have been talked about and their evidences which prove that they are have been the existence of several knowledge systems that are still continued in sometimes in the original form, sometimes with contemporary expressions and technological advancements but there is a base knowledge base.

And we see lot of indigenous materials, tools and techniques, where we see also the involvement of the skills, the hands and the local people. So, this is just one of the glimpses of several existing examples.

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Here this is a very very interesting and very rich research. This research is done by Priyanka Mangaonkar and this was done at the CEPT University, now she teaches in the BRICK school of architecture. Here the material terracotta is discussed and this is an entire mapping of you know how just like what we saw in the previous slide, starting from this clay cart in Harappa, all the way till what we see in the contemporary construction these hollow terracotta blocks and how they are constructed in varied forms with reinforcement without reinforcement and how the stages of transformation have happened and how this material has evolved.

So, basically starting from the scratch, you know how this material was used for daily needs and traditionally the people knew about the material properties and how to moulded or how the potter's wheel could accommodate clay and then we could use, the properties of firing and baking and make objects of use and we see here some drawings, the cross sections and the elevation of you know different objects of use, then here we see the horse, which was used for religious purposes for votive purposes.

So, you know this is what we have been discussed saying and we will continue to discuss throughout this subject that we are talking about tradition on one hand in we are talking about continuity on the other hand and there is this thread linking them, and from here

starting from here this stage of the material, how it was used all the way till here what is the journey that it has traversed.

So, if we look very closely in this slide here we see. So, terracotta was initially used as a material for daily needs we see here the utensils here some toys.

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And then we see it, it was used as expression for religious needs for votive purposes. So, we see lot of religious association, then it was used for surface embellishment. So, the temples of Bishnupura are very famous and they are we see the use of terracotta on those temple facades as surface embellishment here and you know all the pictures and this panel itself shows. And then it was also used to create Pseudo effect. So, at few places where I could not probably have the 3D effect or say a volumetric expression terracotta could be used for that as well.

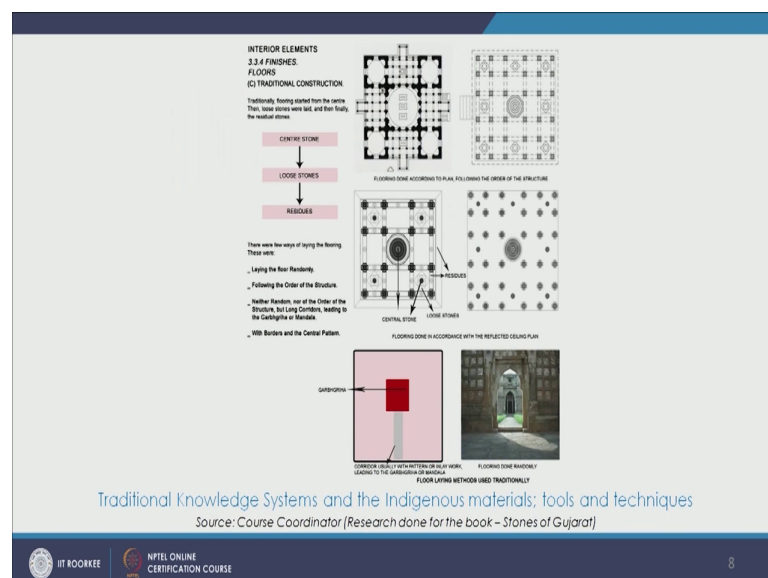
Here in different forms in different ways we see that and then it continue to be used as an object or a space making element in architecture. So, we have terracotta tiles, you have these kinds of tiles, we have these pipes which could be used and then finally, now terracotta is also used as a construction materials. So, we see these hollow terracotta blocks over here and then how they are joined and then the construction happens.

So, this I found very interesting and quite elaborately the research has been done and it maps the entire journey. So, like we saw in the previous slide here there is a zoom in and more details along with the dimensions in everything the objects of daily need as well as the religious objects they have been mapped over here.

So, again I try to establish the link with the history and we see here in this picture another you know object from Harappa. So, this is the dish container and this again belongs to the Harappan times; and this is again a terracotta dish container and it is moulded on the potter's wheel, and then it tells us. It tells us that there was a knowledge of clay area was knowledge of material properties, there was knowledge of how potter's wheel could be used and objects of daily need could be carved out of it. And then all the way from here till here the material knowledge the exposure to material tools and techniques has evolved and human expertise and knowledge has transcended into various forms.

So, this entire panel it gives a clear picture of what we are trying to learn throughout this course.

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This is another research this was done for a book stones of Gujarat, and it talks about the floor finishes and the traditional construction, what was the traditional knowledge system

use for laying of floors and construction of floors. So, traditionally usually what happened was that there was this centre stone and then there was some loose stones that were put around it and then the residues were put to pack the entire laying.

And we also see very interesting ways of how the floor was laid. So, starting from this picture if we see, here the flooring is done randomly. So, here all the stones that are laid are very random and they do not follow really any particular shape or size or form, but they are just randomly laid. They could have in order in randomness also, but that is not the intention they are just loosely and randomly laid.

Then another way is following the order of the structure. So, if we see here, here, here in all these four images over here the flooring follows the order of the structure. So, if this is my structural grid with columns and beams, flooring is also done according to this structure here the order of the structure with all the columns and beams which are put over here, flooring is done accordingly and it is reflected.

Sometimes what was done is that there could be borders added, there could be some inlay work or pattern made that also we seen over here, but largely it followed the order of the structure or the structural grid. So, that is what is seen over here and there was another method where there was a long corridor like this and it would just lead to the central *Garbhgraha* or *Mandala*. So, there were different ways and this traditional knowledge was applied for laying the floors and this is still continued in many constructions this is still continue the same way and there have been lot of contemporary expressions in changes as well.

But here what we see is an established traditional knowledge system and these are the buildings from Gujarat and these are some drawings of those buildings.

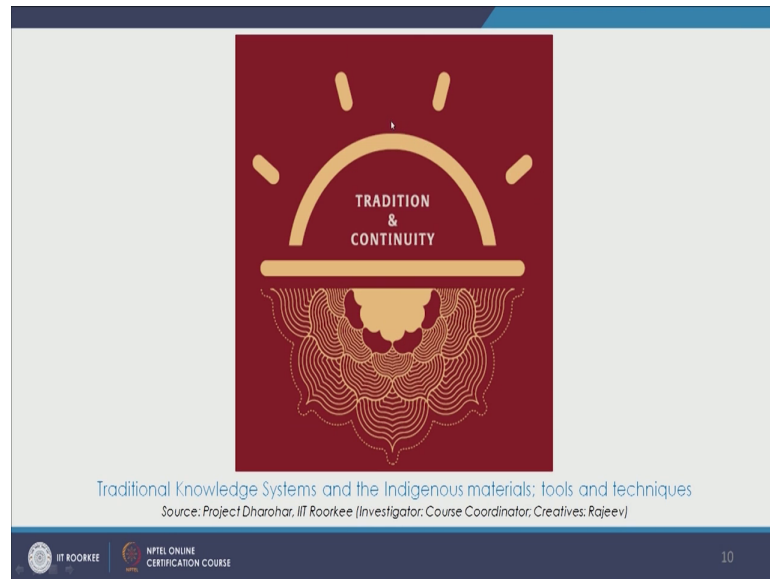
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Now, I would discuss a little bit in detail about project Dharohar which was done in IIT Roorkee the phase 1 is over the phase 2 is going on. And the intention behind this project is also documenting the traditional knowledge systems, tools, materials, techniques the interior architecture, the craft persons their ingenious skills. So, basically this project also had a national workshop as a part of it, the innate part of it and there were like three major themes that were addressed to.

So, first was creating awareness through documentation and dissemination of knowledge. There also the focus was materials, tools and techniques then the interior architecture, crafts, traditions, knowledge systems. Second theme was understanding and learning the skills and techniques. So, we see this graphic that explains the hand eye coordination, which is very important while there is any attempt of making a particular thing or object; and how the craft persons have these ingenious skills and they have this coordination in there hand and eye, and they create wonderful objects.

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And the third theme was tradition and continuity that I keep talking about that, there is an existence of tradition, there are traditional knowledge systems but then how do they continue, how do these skills and craft they do not languish, but they also have contemporary expressions and a continuity, that the people today still value them. So, these were the themes and trying to address to all these three there was an attempt for documentation of traditional knowledge systems indigenous materials, tools and techniques.

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So, here this graphic, infographic again explains this is the part of this is a part of project Dharohar itself. So, here if we see there are different kinds of materials and there are different kinds of technique that are being talked about and this is specific to Uttarakhand. So, here we see the *Aipan* art form about which we already have discuss a little bit. So, this here it also has a material palette and colour palette, which is very indigenous to Uttarakhand.

Here in the second one we see *Ringal*, this also slightly we discussed. *Ringal* is again a native material, indigenous material and it is one of the species of it is like bamboo, it is a local grass which is grown over here, and the baskets or floor mats and now there are different contemporary object products that are also getting made out of it.

Then we see certain lamps over here, which are being made out of *Papier Mache*, then we see this copper it is called *Tamta* in the local parlance and the community, which works with copper they it is called the community of *Tamtas*. And we have *Raam bans* again this is a eco-friendly material its naturally occurring material which is found in Uttarakhand and then several objects of use can be made out of it aesthetic and for surface treatment as well as objects of use then we see lantana now lantana is available in Uttarakhand in abundance its a weed and it grows very abundantly.

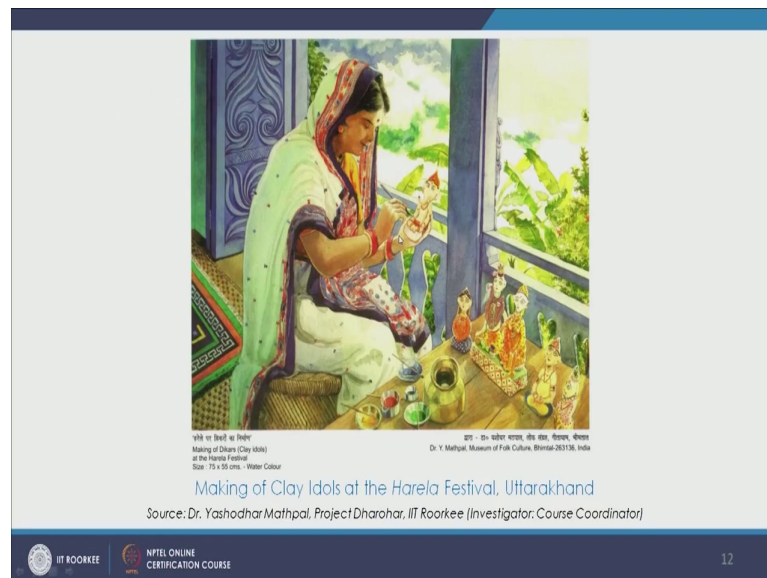
So, here we see this lantana furniture, but then there is this organisation called HESCO in Dehradun they have done some experiments and they are using lantana not just for making furniture, but they have created a prototype for a housing unit and they are testing for the structural stability and climate response. So, there are different ways of taking traditional knowledge systems to a new domain all together. Then we discussed in the last module stone carving and inlay that is also seen at few places. We also seen Uttarakhand lot of Tibetan carpets because of the influence from the neighbouring places.

Nettle Yarn, Himalayan, nettle is natural plant fabric and it is used for several textiles and other structural purposes, then ceramics are seen and lot of objects which products are made out of ceramics. And we also see the traditional knowledge systems and existence of indigenous materials tools and techniques in the hill architecture. Now when we will

discuss in detail case studies from Uttarakhand then we will see some hill architecture examples. So, here this is just you know plethora of materials, tools, techniques and the associated traditional knowledge systems that exist only in the state of Uttarakhand and they are not all of them listed over here these are few major once and then imagine about India how many of them could be the part of the list.

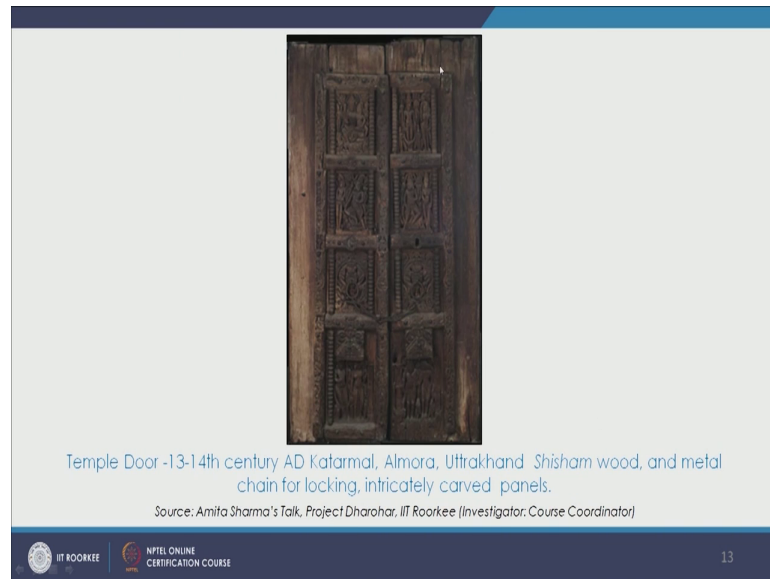
So, it is a very very rich knowledge base and its very crucial to document and learn about it. Continuing the project Dharohar and then focus being Uttarakhand, here we see one painting by Dr. Yashodhar Mathpal, and here it shows a woman making clay toys for a very famous festival and then she also colouring it.

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So, there is this profound knowledge of material clay and also these natural dyes which are used for colouring the idols if there for religious purposes or otherwise for the toys which are made for the kids. So, here if we see the expression, the proportion and the scale in which they are carried out there is a very profound knowledge of the indigenous material and the technique, which results in such beautiful objects and toys.

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This is another image, this is a very intricately carved door made out of *Shisham* the teak wood; and this is from Katarmal Almora and here also we see like this belongs to 13 century AD and there is a exquisite knowledge of the indigenous material and then how the work has being done. Indigenously there are more woods available in Uttarakhand specifically about which we discuss in the last module. So, yeah there is this palette of materials which is more durable which has more strength or where carving is more possible.

But here what we see in the images also the knowledge of material and the kind of tools and techniques that go into the making of such carvings.

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This image here we see a seasonal grass again which is available in Uttarakhand which is grown in Uttarakhand and these baskets are made by tribals, this reflect their traditions, their heritage, their customs they make this object for their daily use also for gifts and these are continue to be made in contemporary ways and they are also sold and the employment is generated for them. This slide is from Alaya design studio and they work with traditional knowledge systems, indigenous materials, tools and techniques specially in Uttarakhand.

Here we see lot of beautiful patterns. So, this is also the knowledge of material and how to achieve certain designs with in it.

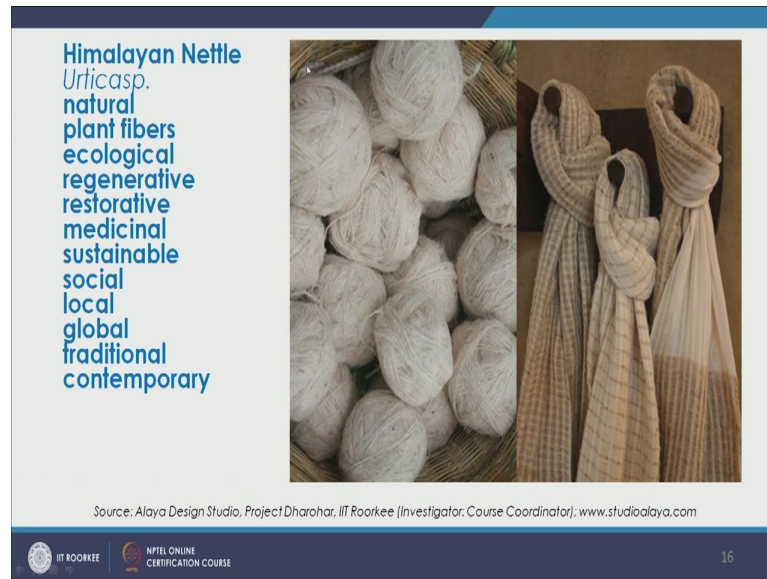
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Here this is again a very interesting slide, and these are some questions which are handmade and they are made in natural grass by the *Tharu* tribal craftswomen in Uttarakhand. And this is naturally occurring grass, its available in abundance its very ecofriendly.

So, the share knowledge of this material which is available in the environment in their surroundings, and the way these women interact with the nature on a daily basis and the harmony in which they live with it. Imparts them the shared knowledge of how this material could be used in varied ways and then it could lead to culturally sustainable livelihoods and you know they could continue to have employment.

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Here we see the nettle, which I also shown in the previous slide. So, this is the Himalayan nettle and its again naturally occurring it is a plant fibre and here see its ecological regenerative restorative, it has medicinal properties, it is sustainable, it is used locally and now it has also achieve the global outreach and it is still done in lot of traditional ways and it also has some contemporary expressions.

So, these are traditional knowledge systems that the communities of a particular region already have which are passed from one generation to another and they have profound knowledge of materials, the tools techniques and making of certain products. So, just by knowing about them and trying to take a grip of what they do, really adds to our knowledge.

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Now, Uttarakhand is very famous for its textiles and I would like to read a little bit here. Uttarakhand is known for its textiles in weavers, in the high hill regions and to some part of the mid region of Uttarakhand, *Bhotia* community has dominated the textile trade. So, here I am again talking about the indigenous community and then how they weave and then they create beautiful textiles. Traditional weavers producing cotton handlooms are located in many villages and localities. So, there are several districts we will see several clusters of weavers and they do different kinds of patterns and they use different kinds of yarns out of which weaving is done.

Uttarakhand has unique environmental conditions for producing all types of silk and it produces more than 40 varieties of natural fibres, and these fibres are very amenable to work on handlooms. So, Uttarakhand has these indigenous materials and the communities that we are talking about, they have this traditional knowledge system.

So, when there are already existing knowledge systems and there is an abundance of indigenous materials, and the knowledge associated with it. It is carried forward and this knowledge continues and for designers like us in the contemporary times, the architects and designers in the craft entrepreneurs, there is lots to learn and take this knowledge forward.

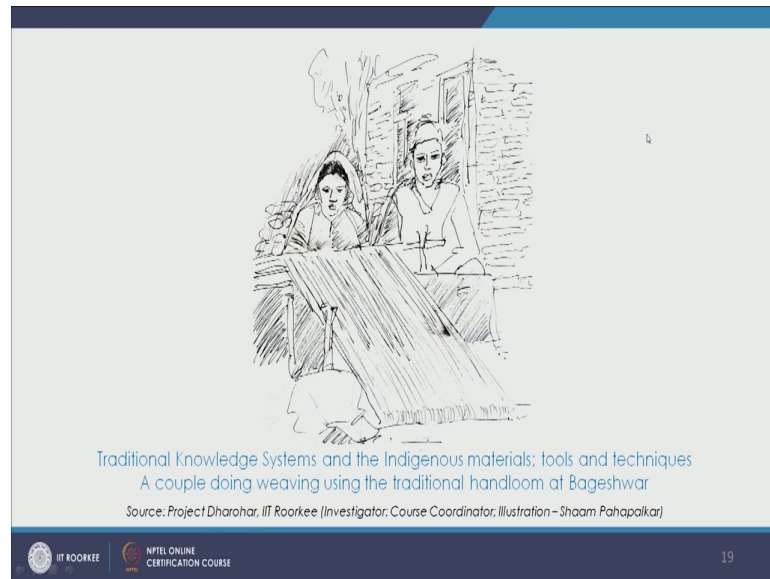
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Since we are talking about weaving, this is the set up by the organisation Avani, its also located in Uttarakhand. And here we see all women weavers and these are all the local the indigenous yarns and the materials that they are using, for making sarees and other textiles. They are also make certain toys and these crayons for the kids which are natural, and they also make natural dyes from plants and raw food material like rice and turmeric (*haldi*) and the plants, which are found in the nature just next to them.

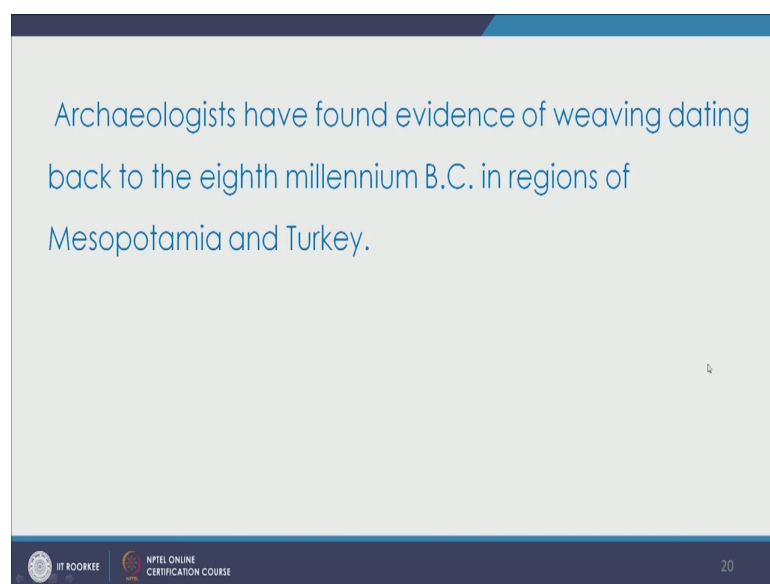
So, here also we see lot of involvement of traditional community knowledge systems and how they work here together and take this knowledge forward.

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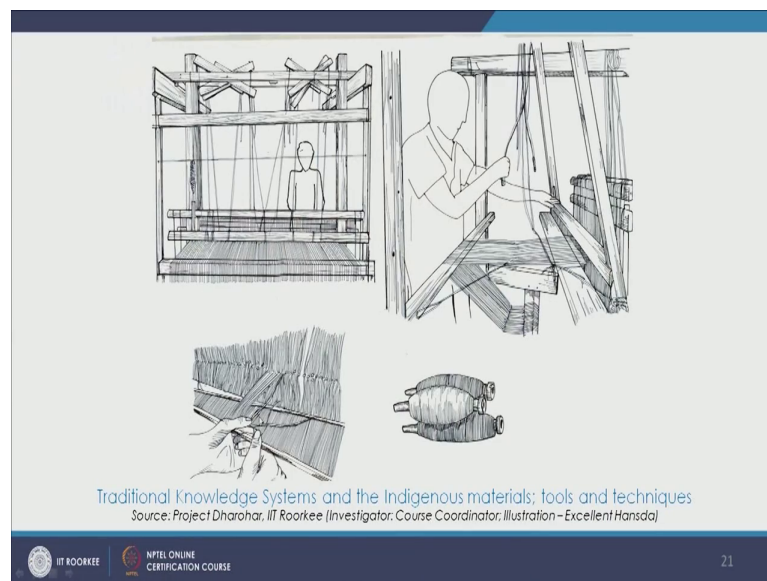
So, traditional handlooms and the weavers of Bageshwar in Uttarakhand are also very famous Bageshwari textiles and handlooms are very famous. So, here we see a couple who is weaving using the traditional handloom. So, the handloom again it is an apparatus which is used for weaving by this weaver community, that is also traditional and the weaving here is done traditionally; and there are lot of unique exquisite pieces which are customise and they are not available for mass production.

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Now, if we talk about the history of weaving then there is a slight ambiguity related to that, but archeologists they have found evidence of weaving dating back to the eighth millennium BC in regions of Mesopotamia and Turkey. So, these are thousands and thousands of years old traditional knowledge systems, which have got transferred and transcended and disseminated over a period of time to different regions through different people and communities.

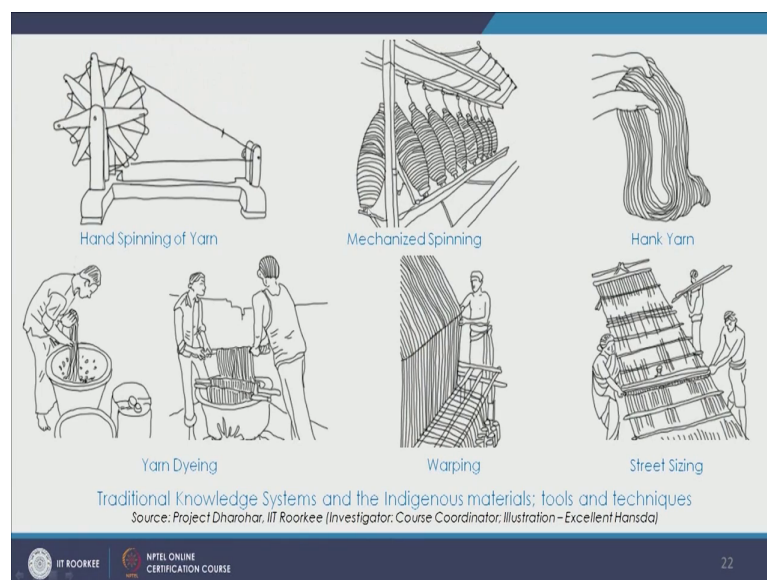
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So, here as part of this project Dharohar we were trying to understand the traditional knowledge systems related to the weaving and we had invited the weaver community of Uttarakhand from few clusters, and we were trying to understand how this loom works how this Yarn that we see over here. So, Yarn is the basic material it could be silk it could be cotton, it could be natural fibres like we just saw a couple of slides ago, and it could be technologically advanced that we are getting nowadays, but since we are talking about indigenous materials will keep are focus to that.

So, what kind of yarns and then how they are put here stretched and put over here on the loom, and then how the loom is being work by the weavers, what kind of postures do they used to set. To that was the entire intention to understand the technique, the material related to the weaving and what is the craft of weaving, and how do they craft persons actually make these amazing products. So, just to simplify there are few illustrations.

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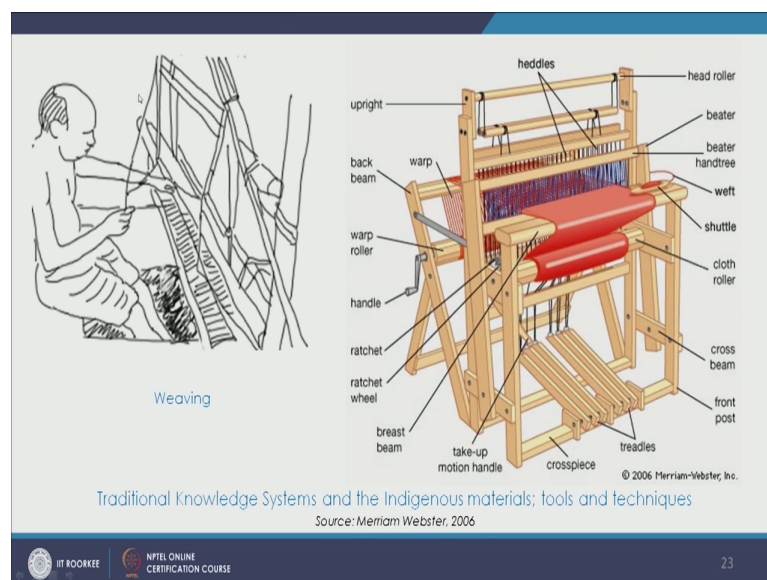
We have to begin with Yarn which is the basic materials. So, Yarn could be hand-spun or it could be a mechanised spinning, then it is turned into certain coils which has the count depending on which fabric is to be woven or what density we require and I am explaining it very briefly.

Because it is important that this all is seen live and understood from the artisans or the weaver community itself; Then after it is turned into coils and this Hank Yarn is made then the dyeing happens now it could be natural dyeing or it could be chemical dyeing, but natural dyeing is best and its quite eco-friendly. So, dyeing happens and then this Yarn is warped. So, this warping happens it is stretched and it is put to the looms.

Now here these weavers have the knowledge for what length of the textile to be woven whether its a shawl or a saree or something else, how many threads what should be the count, what should be the density. So, these yarns are stretched and then they are put here on the loom and then street sizing happen. So, these yarns and the warp that is been put it is starched.

So, that during weaving there is no wear and tear and the product comes out nicely. So, these are just few steps, they are some in between delicate detailed steps that probably I am not putting right now just to give an overview.

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And then after the warping stage sizing this weaving starts and the craft persons sit in a varied postures and then they work on the Yarn and they create the different textiles. Just to understand what are the different parts of this handloom, I have just referred to this picture and of course, it explains a lot of the components here, but which are not in the local parlance, weavers have their own ways of calling these different elements.

But the major thing here to understand is that any textile or any piece of weaving, it requires warp here we see this stretched Yarn over here this is the warp and we see here this one which is attached to the shuttle sorry which is attached to the shuttle this is the here weft. So, there is a warp and there is a weft and then this we have to stitch it sorry weave it in a particular pattern, which is required. So, it is all the play of warp and weft on this loom with which beautiful patterns and designs and textiles are created. And there is a lot of hand eye coordination hand eye feet coordination.

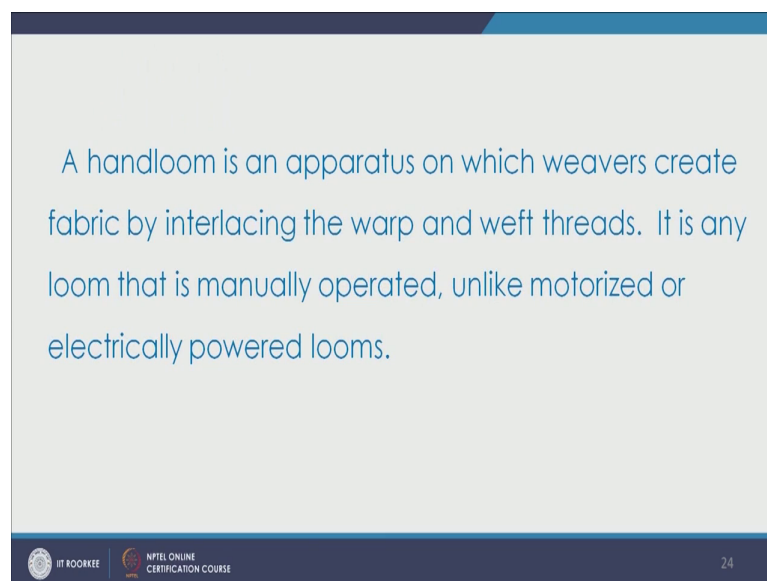
So, the craft persons sit they have to move all these components of the handloom with their feet plus they have to move the shuttle across this section from here to here, and they also have to carefully look while they are weaving certain pattern. So, it is a very very difficult task it is very challenging and they are very skilled to do it is.

So, all the craft persons the weavers are very skill to do it, and this is traditionally past knowledge system, which is still use the kinds of looms have changed. So, here if we see this loom now we find different kinds of looms there is power loom, there is jacquard there are many other kinds of looms, but the warp and weft and the way the weaving is done still continues.

In fact, there are lot of interpretations of weaving into many other disciplines even in architecture just by this principle of warp and weft in weaving we could create different structures, we could also have surface embellishments and we could have concepts like architectural clothing or architectural skin.

So, that is for another module I am just trying to link a little bit. So, we just saw the handloom it is an apparatus, on which we were create fabric by interlacing the warp and weft threads.

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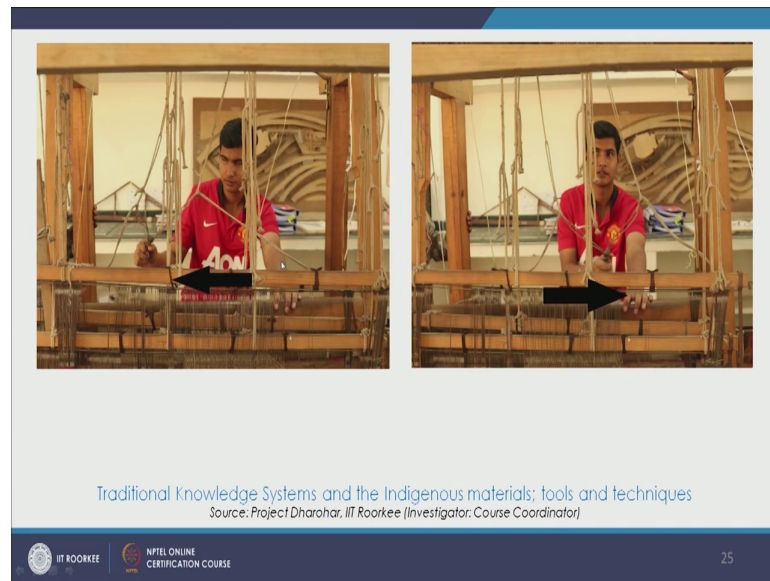


It is any loom that is manually operated unlike motorised or electrically powered looms. But we do have also the electrically powered looms these days, but the weaver communities and the craft persons still preferred to work on their traditional handlooms definitely they have the knowledge of their traditional apparatus and they still like to continue working on that but having said that any kind of technical knowhow or any

kind of technique that could improve the working of that apparatus or reduce their effort is welcome that is welcome and it just that they has to be a balance like we discuss in the previous module.

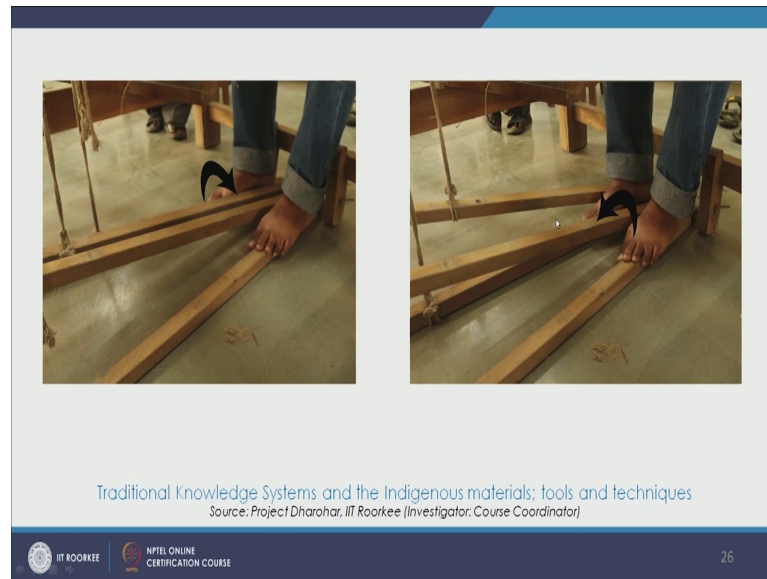
It cannot be entirely, it shouldn't be entirely machine and if the handwork could be somehow facilitated by some technique or know how then why not.

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These are some pictures of the project in the workshop that was conducted. So, students also learnt how to work on the handloom and the shuttle that I showed in one of the previous images, it moves from one direction here in one direction and then back again in this direction and that is how the weft and the warp are used to weave patterns.

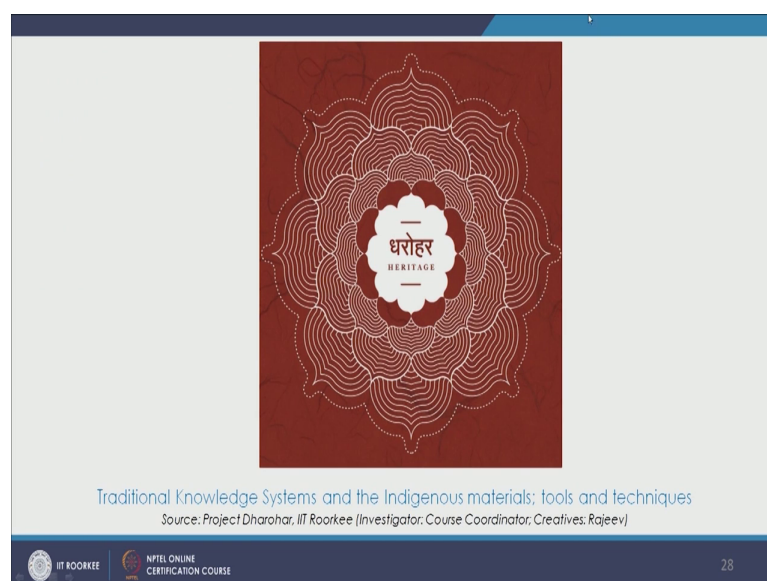
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Like I told there is also the movement of feet and both of them here, if we can understand through this pictures.

So, there is a continuous coordination hand eye feet mind it is a very challenging task here we see in all the pictures. So, all of us all the students including myself, we tried to learn and it was quite a challenging task.

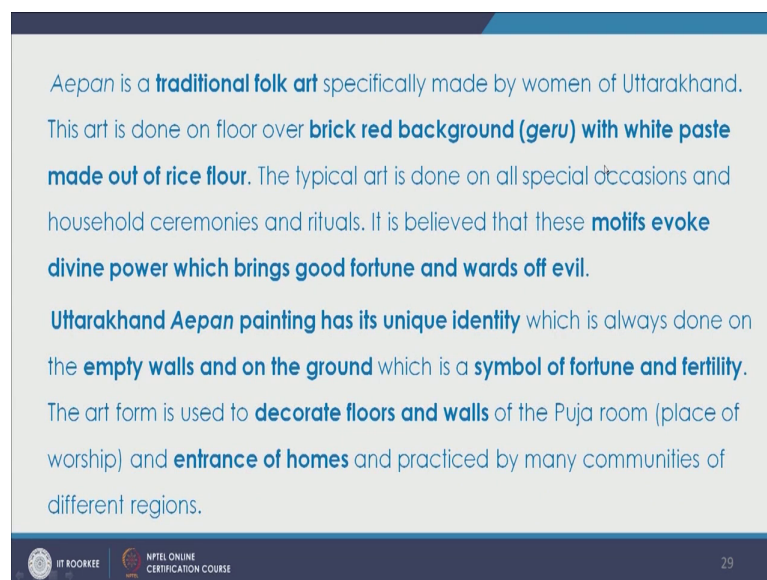
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Then the another materials or a technique or the art craft form that we learnt through this workshop was the *Aepan*. *Aepan* itself I have a I have introduced in the previous slides and maybe a little bit we will see what are the indigenous materials and the techniques how it is done.

So, *Aepan* again they are like ritualistic paintings it is a very old form of expression and like Uttarakhand it is done in other parts of the country also, and it is known by different names like we also see the *Alpana* in Bengal. So, these are all the forms of expressions and they are usually done by women.

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So, if we talk about Uttarakhand, *Aepan* is a traditional folk art specifically made by women of Uttarakhand. This is done on floor over brick red background. Now, that brick red background comes from the indigenous material *Geru* with white paste made out of rice flour.

So, there is this red background made out of *Geru* and then with the rice flour there are different motives, and *Chaukis* and patterns which are made on that. The typical art is done on all special occasions and household ceremonies and rituals, it is believed that these motives evoke divine power, which brings good fortune and wards off evil. So, there are belief systems associated to these forms, it is an expression of a community it

has indigenous material, which are again ecofriendly and easily available in your own kitchen. So, those materials are used and again they are very aesthetic and they are seen on the floors of the walls of the house.

Uttarakhand *Aepan* paintings they have a unique identity they are usually done on empty walls and on the ground and it is considered to be the symbol of fortune and fertility. The art form is used to decorate floors and walls of the puja room specially and entrance of homes. So, if we see the entrances of the residences of Uttarakhand they have beautiful *Aepan* paintings on the threshold and the entrance and their practice by many communities of different regions. So, these are again very traditional paintings and there still being done by different communities. In fact, one of the residences that I showed in the previous module is like 300 years old and it still has the original *Aepan* paintings in it.

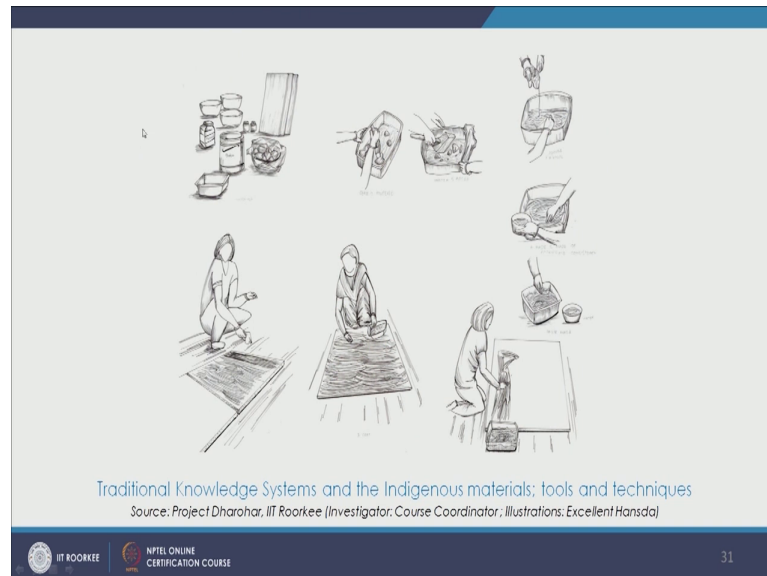
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This is one painting again by very famous Dr. Yashodhar Mathpal and this painting shows the women of the community they are making this *Aepan* ritualistic painting they are celebrating a special occasion and its being made in this central courtyard. So, it is also a space for social inclusion interaction coming together of people celebrating together. So, these traditional knowledge systems somehow also reflect on the ways of

life of the society, and how they connected all the people together. So, this is again *Aepan*.

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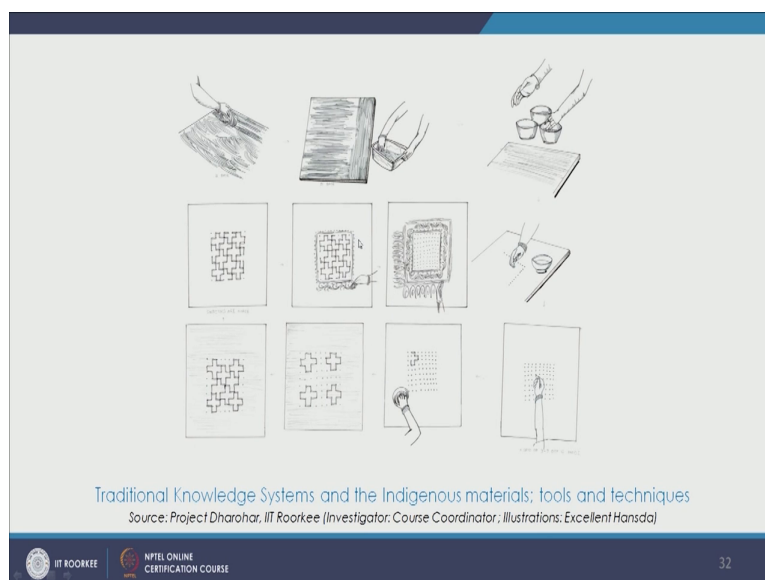


These are the techniques in the materials. So, illustrations for done during the workshop which was a part of the project Dharohar.

So, here we see the materials the *Geru* the white floor, now because this workshop was done as a demonstration, it was done on a board MDF board, and there was a fabric also that was used. So, there were fabric *Aepan* and there was this floor *Aepan* which for which the base was taken as the MDF board. So, this paste is made *Geru* is made and then it is applied.

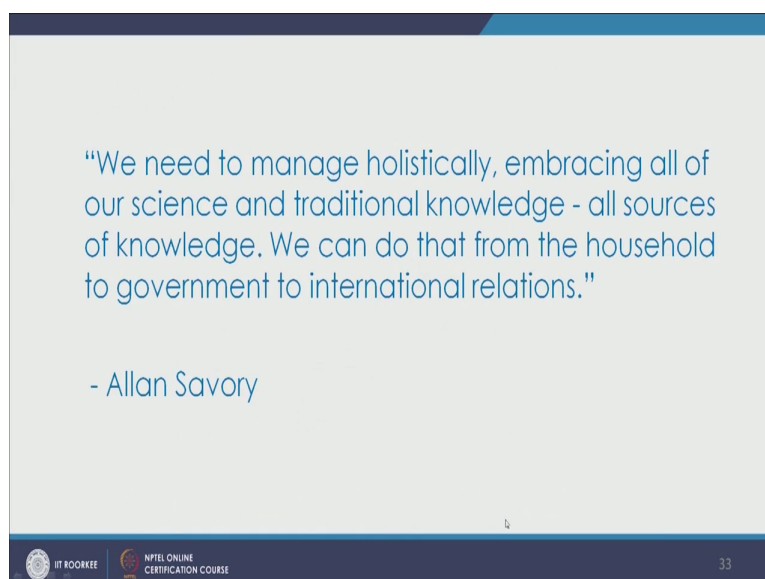
So, far this workshop which happened recently the adhesive was also used because it was a demonstration and it had to dry quickly and it had to be explained to the participants. So, the base material is made and then this base is it is applied on this base. So, in original form if we see is its *Geru* and then with the rice flour the varied motives *Chaukies* patterns are made.

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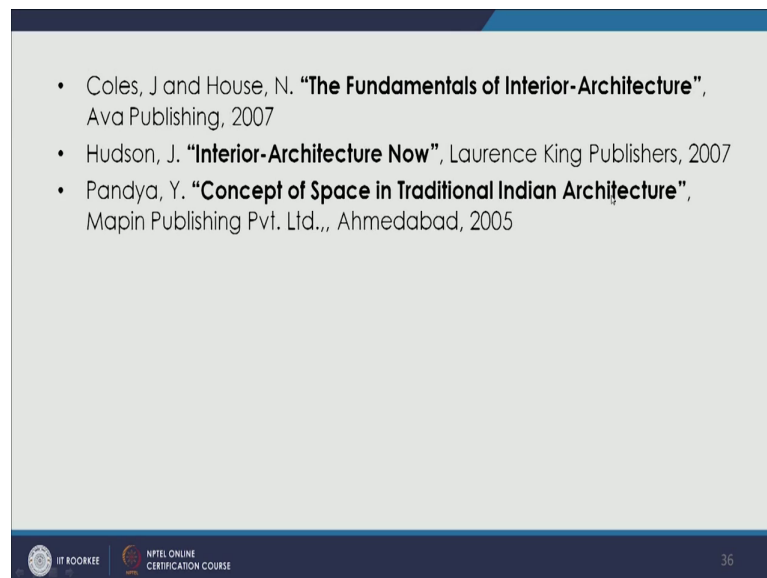
So, here we see a *Chauki* this I showed in the previous module also all these *Chaukies* have significance. So, there is Durga *Chauki* there is Lakshmi *Chauki* there is Shiva *Chauki* there is Swastik *Chauki* in all of them have different connotations, they have their different importance and religious connotations again and they are done for fortune and for the happiness of the family.

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I would like to end by this interesting quote again, “We need to manage holistically embracing all of our science and traditional knowledge all sources of knowledge. We can do that from the household to government to international relations.” So, traditional knowledge systems form a very crucial part of all our activities from a day to day activities to hear the writer talks even about international relations. So, if we focus on culture traditional knowledge systems and try to create ties between communities, it can also be done for nations. So, in the next module we will see the summary and discourse of the previous few modules references for help.

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Thank you.