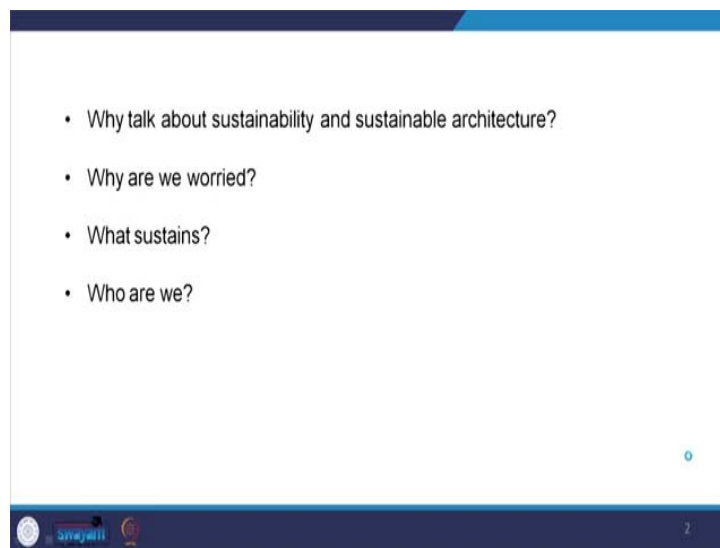


Sustainable Architecture
Prof. Avlokitha Agrawal
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Indian Institute of Technology, Roorkee

Lecture – 01
Introduction to Sustainability

Good morning, I am Doctor Avlokita Agrawal, assistant professor at Department of Architecture and Planning, IIT, Roorkee. Today, I am going to start this course on Sustainable Architecture. Now, before I start about what sustainable architecture is and what are the technical details methodologies and processes of deriving sustainable architecture of designing sustainable architecture I would first start with the philosophy of it, why at all are we talking about a thing as sustainable architecture.

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So, couple of questions which we would like to answer through this introduction to sustainable architecture are why at all are we talking about sustainability and sustainable architecture and why at all are we worried? What is it that sustains, sustains forever and who are we? Why are we looking for solutions? So, before we look for solutions we must understand what is our own identity, that will help us in seeking solutions to some of the problems that we will encounter.

So, we will start with the first question why at all are we talking about sustainability and sustainable architecture. So, it is not just architecture where sustainability is being talked

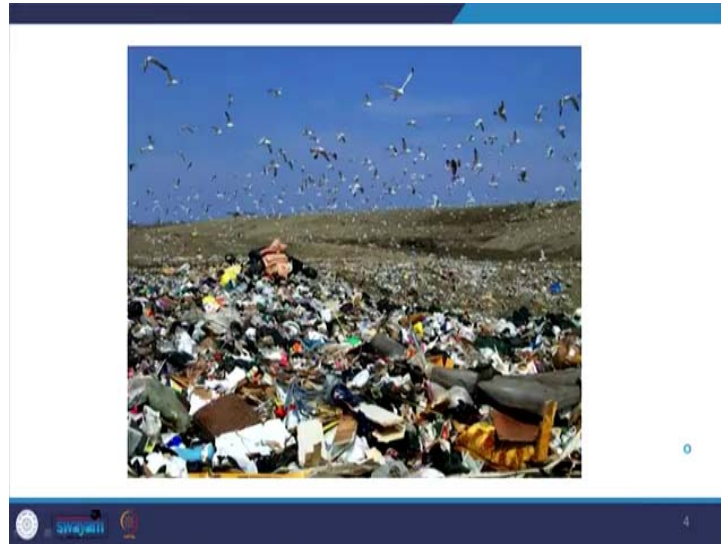
about, we are talking about sustainability in almost every domain of life here, we are talking about sustainable transportation, we are talking about sustainable cities, we are talking about sustainable development and we are also talking about sustainable architecture.

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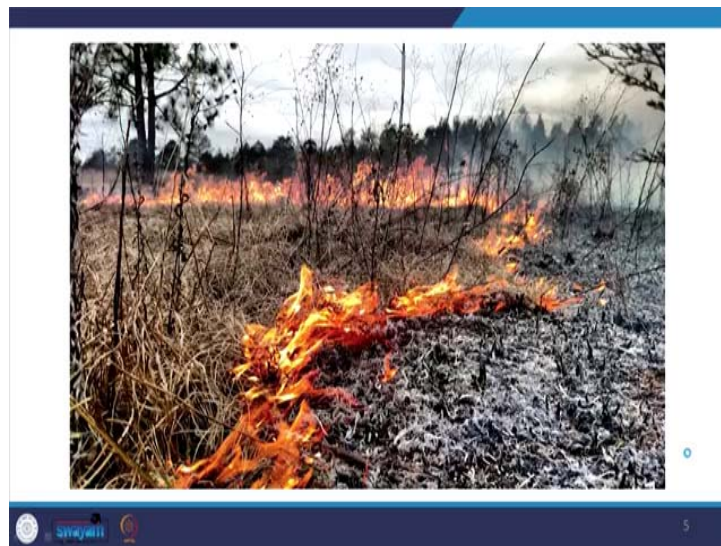
Why are we talking about it? Because of some of the problems like the one on the screen. An environment has been totally degraded there is no clean air to breath, there is no clean drinking water available or if it is it has reduced greatly in the quantity. So, it is available for a very small population of the world.

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We have lot of garbage, lot of waste which is lying around us polluting our environments further.

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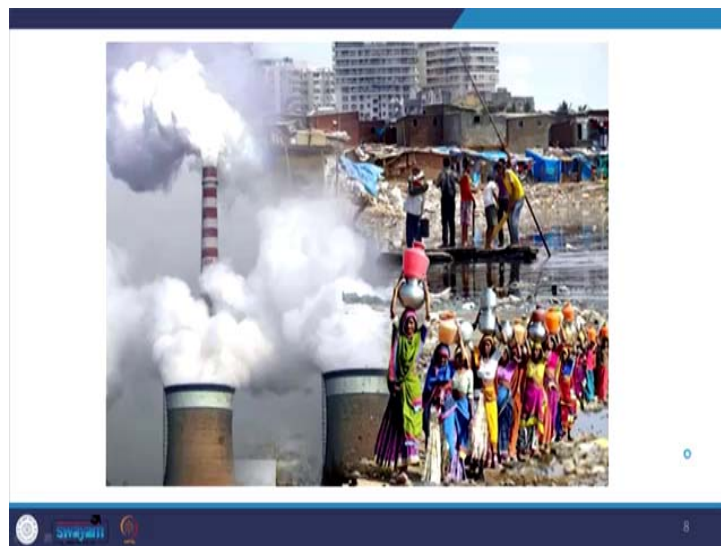
We hardly have trees left environment which we require to breath to flourish to healthily grow and also to rejuvenate ourselves. So, this overall environment in which we are living has been degrading day-by-day. So, why are we worried? We as humans have been surviving for all these centuries all these ages and we are the most intelligent

creatures of the world of god, why are we worried? Cannot we still survive all that pollution?

Yes, we are doing, we are developing technologies to clean the water; we are developing technologies to clean the air; we are developing technologies to carry ourselves to move transportation devices; mechanisms which are intelligent which are technologically advanced; we are reaching out to space; we are reaching mars; trying to build communities, colonies there on mars; we are reaching moon and we have conquered almost the entire universe, why are we still worried?

Are we worried for this polar bear which is on the verge of extinction; are we worried about the glaciers which are melting; are we worried about the forests which are burning on an everyday basis; are we worried off for all that, that is happening around us, probably not. So, what is it that is keeping us worried? We are worried about our own future.

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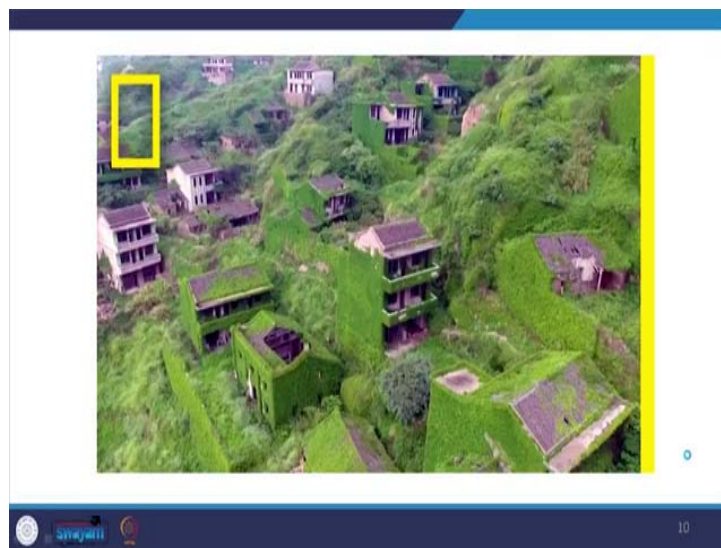


All these environmental changes which are happening because of the so called development which is taking place our own survival is at stake. We are worried for our own future, we will not have water to drink in the times to come, how would we survive, how would we sustain. We will have no clean air to breath how will our children go out in the open and work, play, carry on with their lives. How would we survive? that is

what is keeping us worried with so much of climate change happening, so many of tsunamis and cyclones and earthquakes the intensity as well as the frequency increasing.

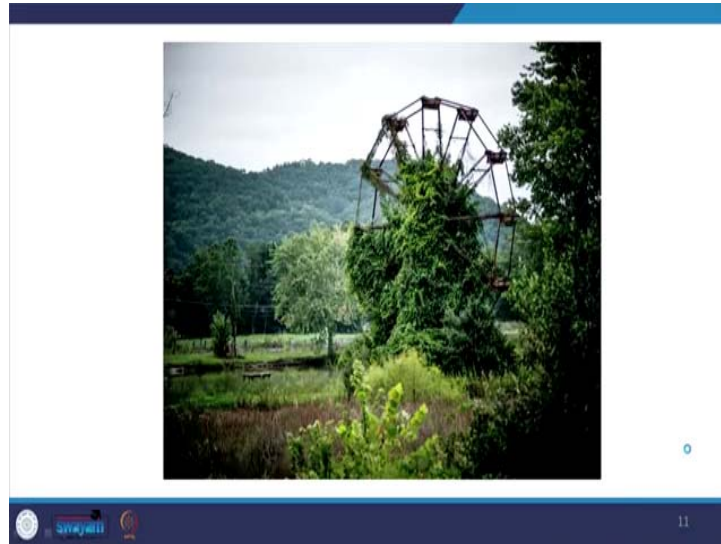
There is more and more damage to human life and we are worried about that only. It is not a damage only to human life, it is a damage to all other life forms as well, but we are worried about our own existence and that is the reason we are talking about solutions which are sustainable which will continue to go on, and we very clearly know that what we are doing is not sustainable it cannot sustain for a longer period.

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So, the question is, what sustains? This is an image of an abandoned fishing village in Russia which has been left on its own and we can very clearly see what sustains here? The only thing that sustains here is nature. Nature sustains itself anything that is left to nature we will sustain we will grow on its own in its free form.

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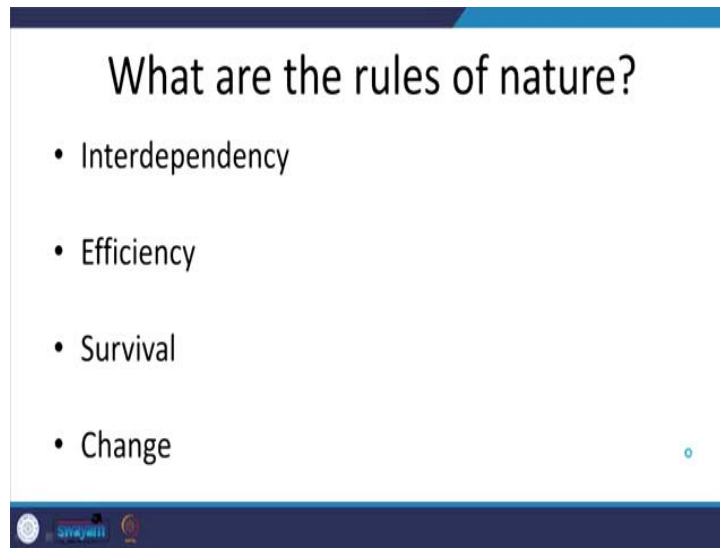
And as humans, we have very clearly understood that it is only nature which can sustain itself none of the artificial human made development or structures will survive or sustain if it does not follow nature. And, who are we? When we are talking about nature as a separate entity and we human beings are able to create something which is not nature is not there a conflict.

We are talking about identifying our own selves and that is the question, who are we? We are part of nature, we are an integral part of nature and a very small part of that nature which has thousands and thousands of other life forms plants, animals, varieties and species of them, we are just one small portion of that. But, we have made ourselves so dominant that we think that we can take care or take over rest of the life forms and the nature around us, but essentially we are an integral part of that nature, we are the nature itself.

The moment we detach ourselves our built environment, our buildings, our immediate surroundings and environment from nature is where this problem comes from. Where this entire problem of sustainability of not sustaining comes into picture? Long back when human identified himself as part of the nature these problems did not arise.

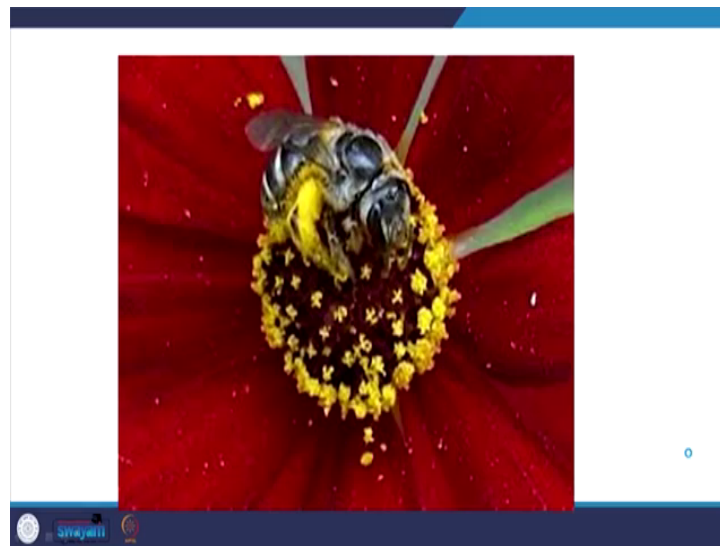
So, when we say that a only thing the only thing which sustains is nature. So, we have to abide by the rules of this nature and there are very clear distinct and identified rules of the nature, these are interdependency, efficiency, survival and change.

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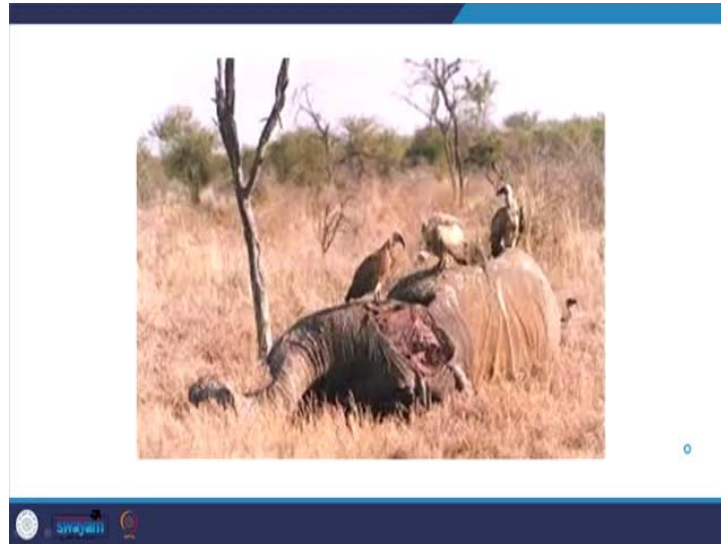
First of all let us look at the rule of interdependence. Anything in nature follows this essential rule of interdependence, nothing in this nature is independent.

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Everything for its survival requires the presence of other beings around it, they may be life forms or they may not be life forms, but we require them. And, there is an interdependence it is not that one is dependent on the other, it is always a mutual thing for our food, for our life, for our sustenance we require all these other forms.

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If we realize that and we realize that no individual can probably survive, but it is only a community and different communities together and an entire ecosystem which will healthily flourish and survive is when we will be able to create these systems which are interdependent in nature.

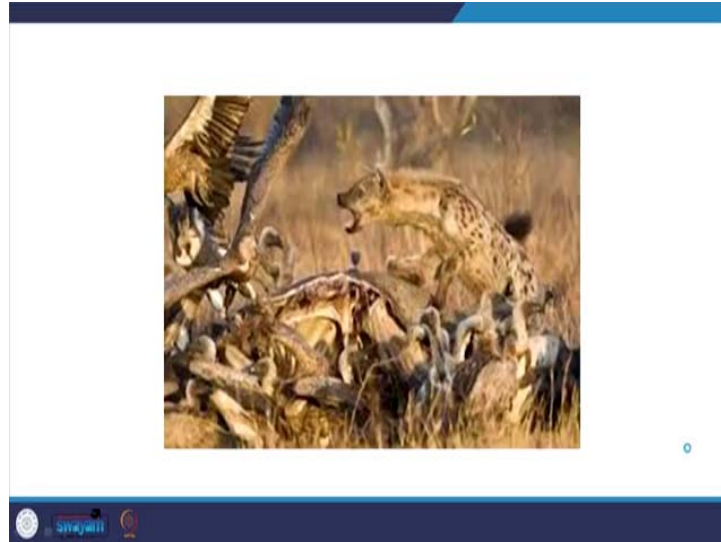
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The waste from one is always a useful product to the other or there are systems in nature which take care of that waste, and nothing is actually a waste. All our systems have to realize that and form such interdependent systems where nothing is a byproduct or a

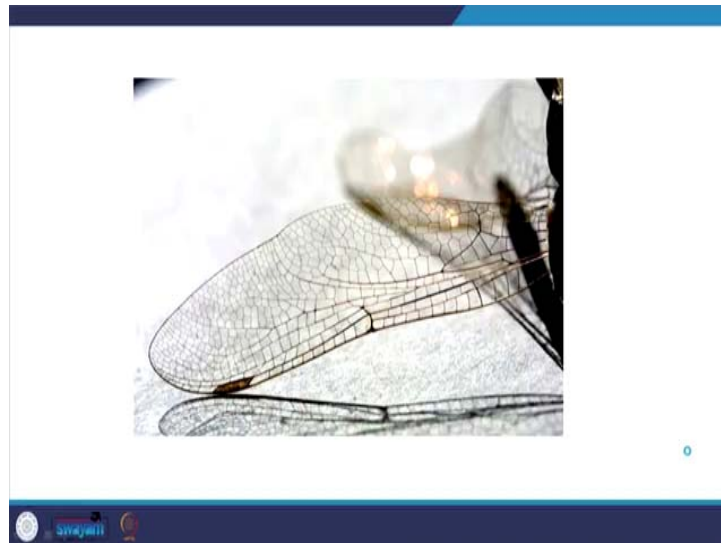
waste and everything is within a circle and utilized by the other system, it is an interdependent system.

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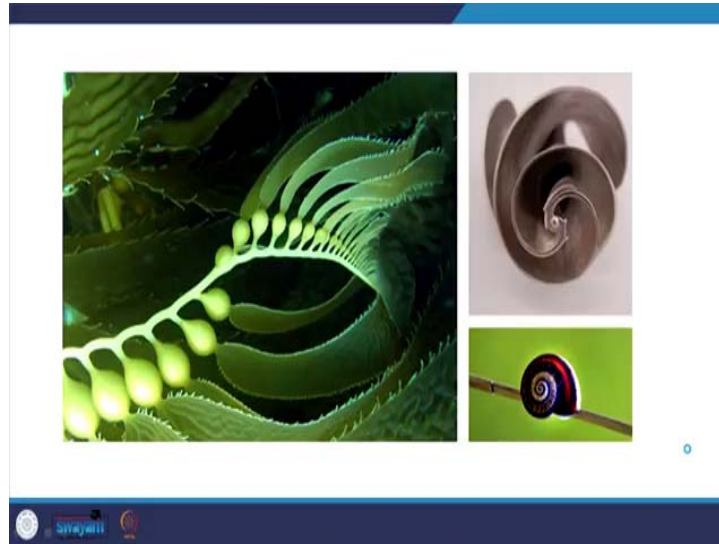
The next is the rule of efficiency. Anything that survives in the nature is highly efficient by virtue of its design, by virtue of the way it consumes resources and produces these byproducts which are of course, useful to the other.

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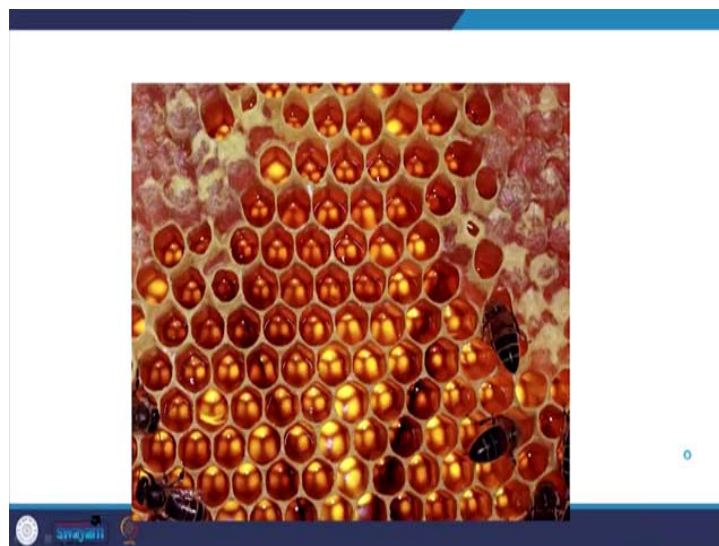


Anything that flourishes and survives, sustains is efficient.

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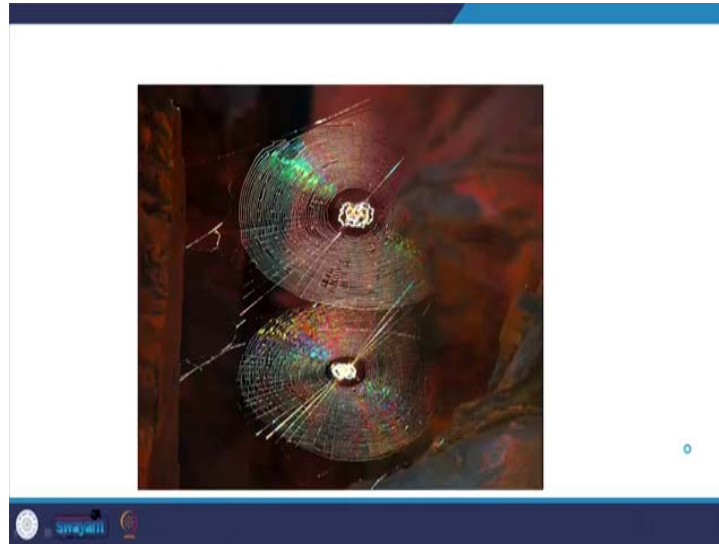


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However, we as humans are not too bothered about efficiency. Many our times our systems are highly inefficient they eat up, they take up a lot of resources like energy, water, air and in turn pollute them or do not produce the intended result in an efficient manner, this is the rule of efficiency that we are talking about. We look at any design in nature anything that has survived or sustain itself is highly efficient.

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And the one which was not has collapsed and has been taken over by other systems.

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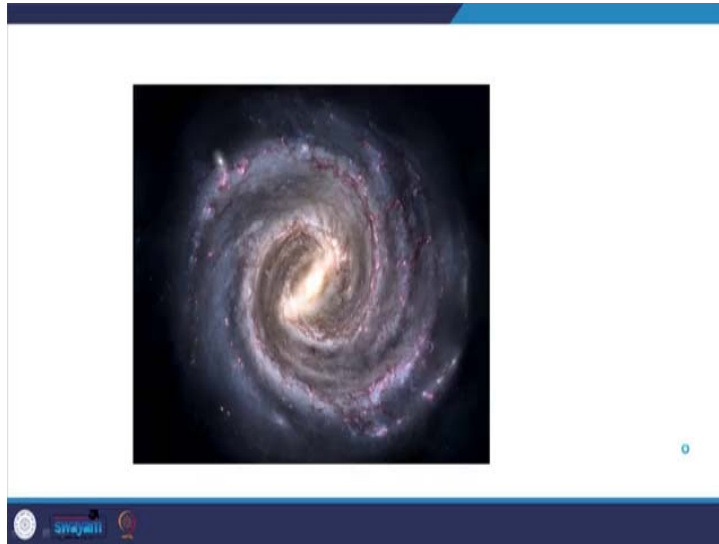


We by virtue of the intelligence that we possess or the power that we have, we make our inefficient systems run for long, but in the long run they cannot sustain and that is what we are realizing gradually. Transportation systems which are inefficient are gradually being replaced, construction systems which are inefficient are gradually being replaced.

And, we would realize the problems or issues arising out of inefficiency when we have a greater demand and less of the supply as long as there is less of demand and ample

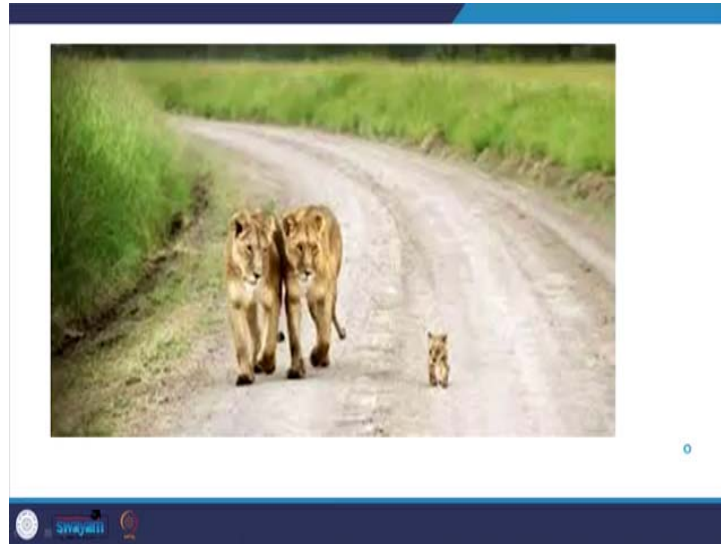
supply. We would not realize the problem of this inefficiency arising, but looking at the world today. We have huge population, global population and we have we require so many resources to fulfill the needs of this population that is where we realize that every system has to be efficient.

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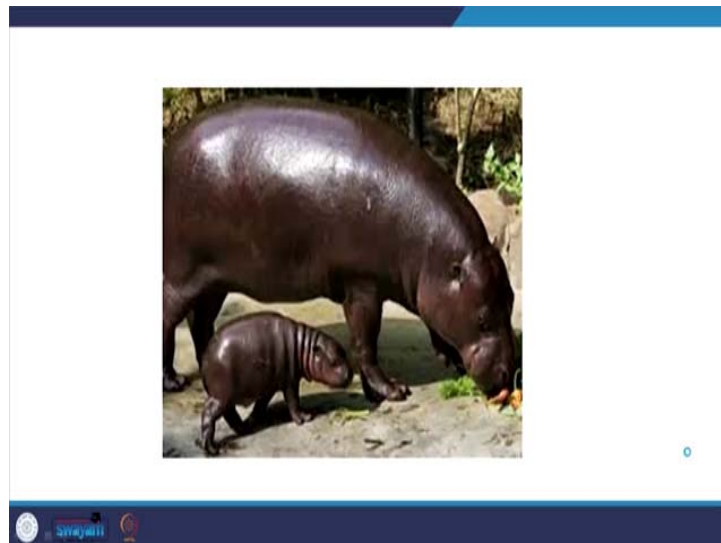
So, from micro scale micro level beings things around us in nature to the macro ones such as a Galaxy ~~Real~~ Sea itself, everything by virtue of its design, form, consumption of resources it is efficient. Next is the rule of survival; so, it is always this survival of the fittest. So, it is not that our systems have to be efficient or interdependent they have to be strong, they have to be robust to survive the test of time.

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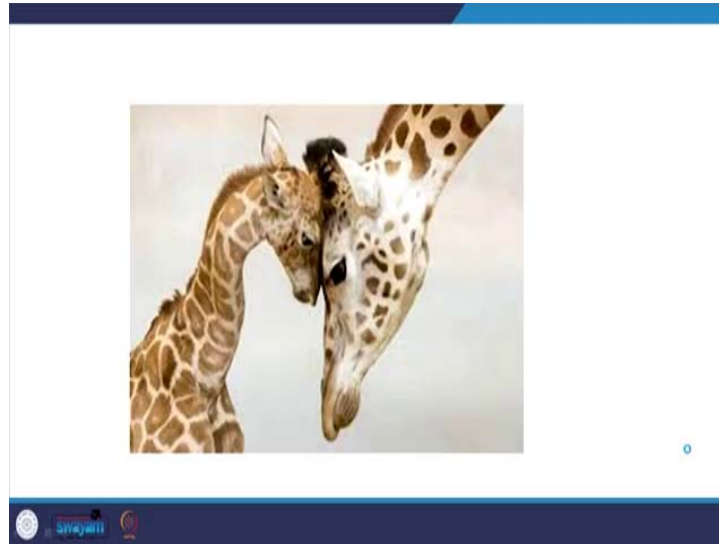


We cannot create fragile systems and expect them to sustain the systems have to be robust. However, when we come and we look at examples of what sustains we may also come across systems which are weak or fragile, but they have different mechanisms to survive. For example, here we look at one species which is strong_ very strong.

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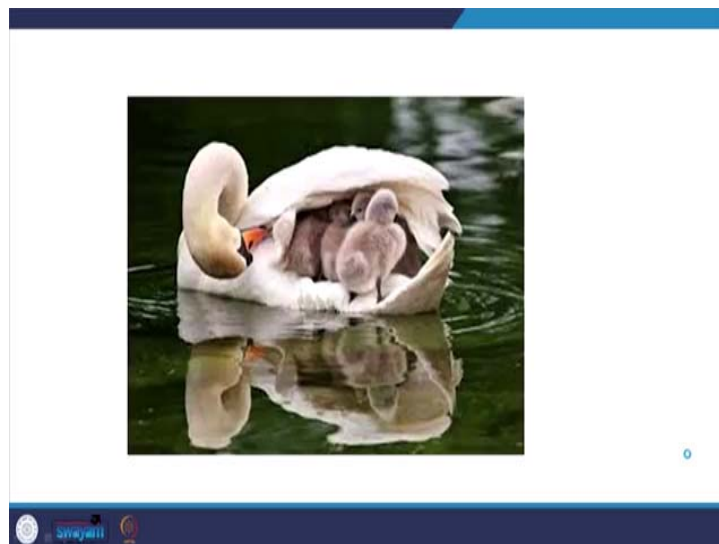


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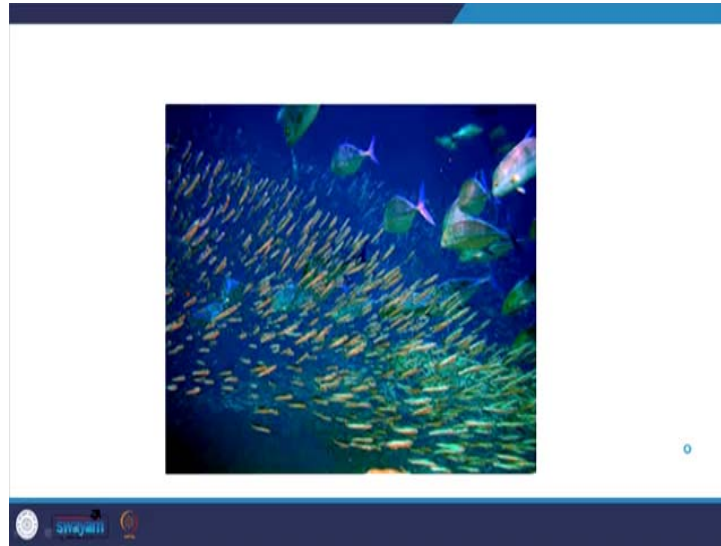


So, there is lesser of that offspring, lesser population because it will be able to survive itself same with other very strong or robust species, same with very strong efficient systems. They do not need a larger or bigger number to survive or sustain; however, if we look at systems or species which are weak which are not so strong, there we would require some other mechanism.

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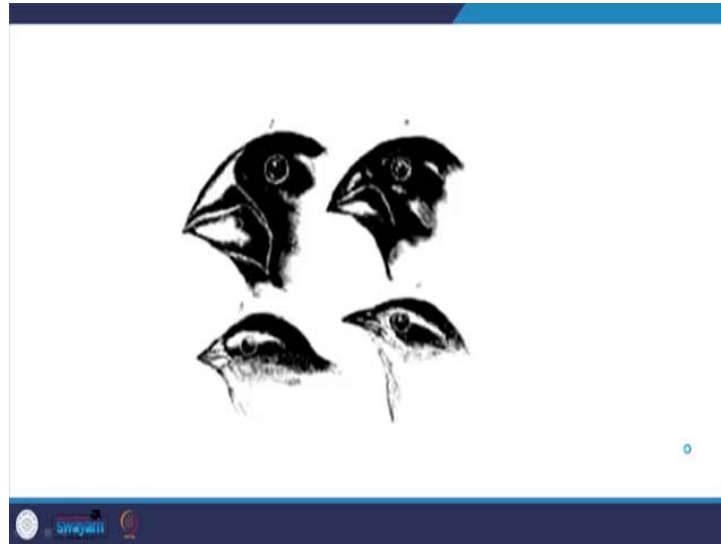


For example, here the mechanism is larger population because large number of these this specie will actually be eaten up, taken up as a food as food by other species which are more stronger and have lesser population. So, in the end it is a balance, they will still survive, but by virtue of something else. So, for example, if we looking at architecture synonym, we have a hut which consumes lesser resources.

For example the dried, wood and leaves and ~~tatchoueh~~ like that it consumes less amount of resources it is very fragile, but yet it sustains because year after year the same resource which is required to construct that hard hut will be added, replaced, replenished or it will be reformed.

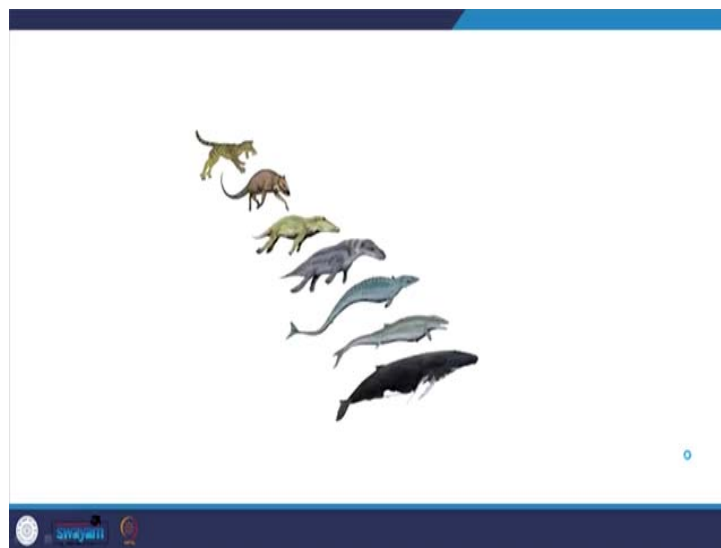
However, if you look at a very robust fort where the kind of material which has gone in cannot be replenished or replaced every year, year after year it cannot be recreated. So, there are different strategies to how systems sustain one of them being the rule of strength survival.

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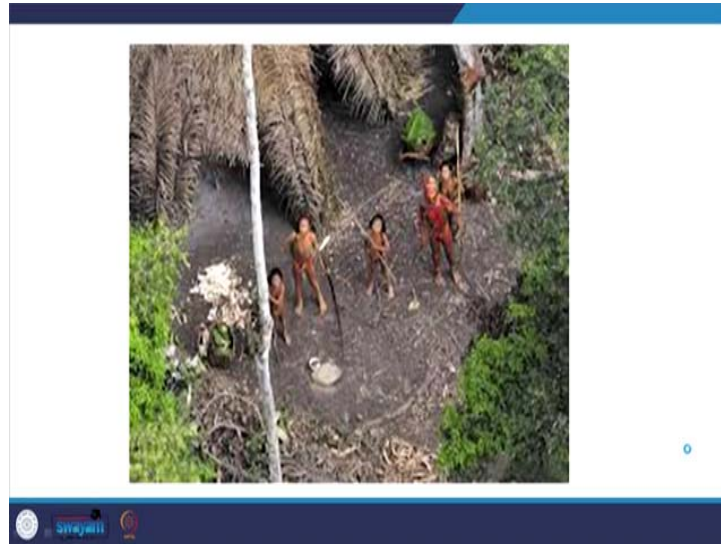
The last but one of the most important rules of nature of sustaining is the rule of change. Anything which adapts itself and evolves changes with time the context and the requirements is more likely to survive and sustain.

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If we do not change, if we do not evolve so, this is a very common and established theory of adaptation you can read more from this link on adaptation; so, this is from nature.

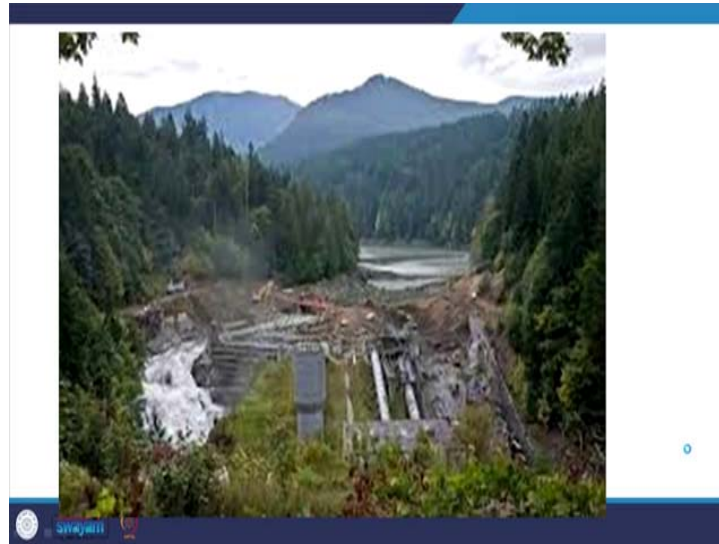
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But, when we adapt when we change to the given context and circumstances situations is when we are more likely to sustain to survive. The answer to which we were looking for was who are we and the answer to that was we are part of the nature, and early human beings very clearly understood that realized that they were part of the nature. And hence, the living the way they lived was integrally connected derived from nature and we really did not have problems.

So, if you look at the native tribes from all over the world in different climatic zones, in regions which have different resources available with them. We see how humans were integrally connected to nature. For example, this tribe in the tropical part of the world the kind of clothing they have, the kind of residences, the kind of huts that they have are directly responding to the nature around them.

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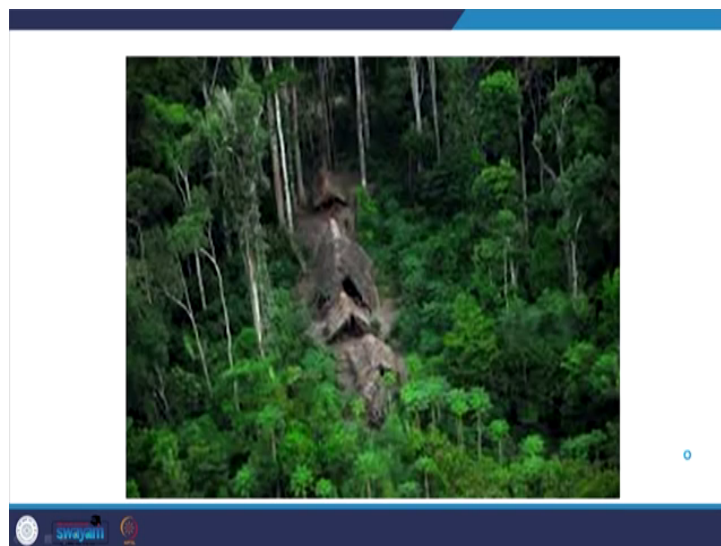
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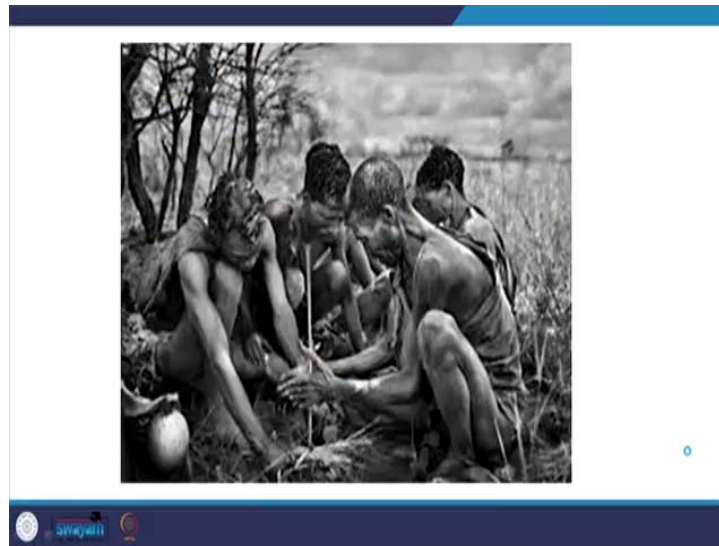


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If we look at some of the warmer regions the responses are very very similar. How they respond to the rains heavy rains which are there, how they respond to the heavily thickly grown forest which is around them.

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The responses are contextual..

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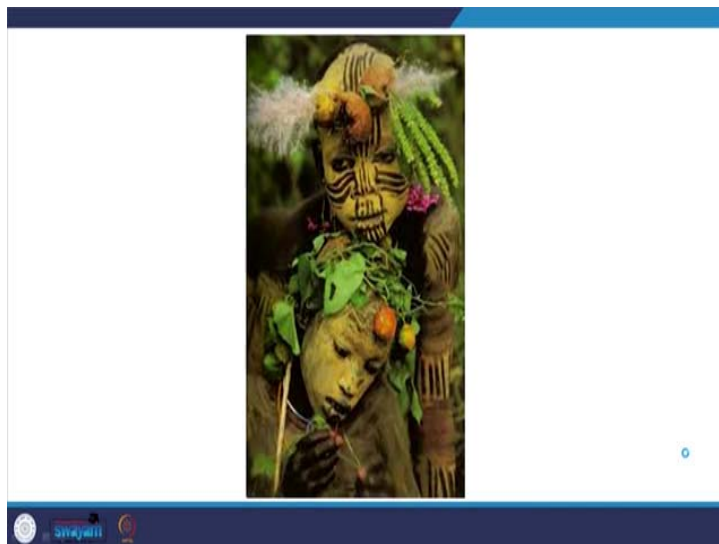
That is what all the human beings across the world who are doing.

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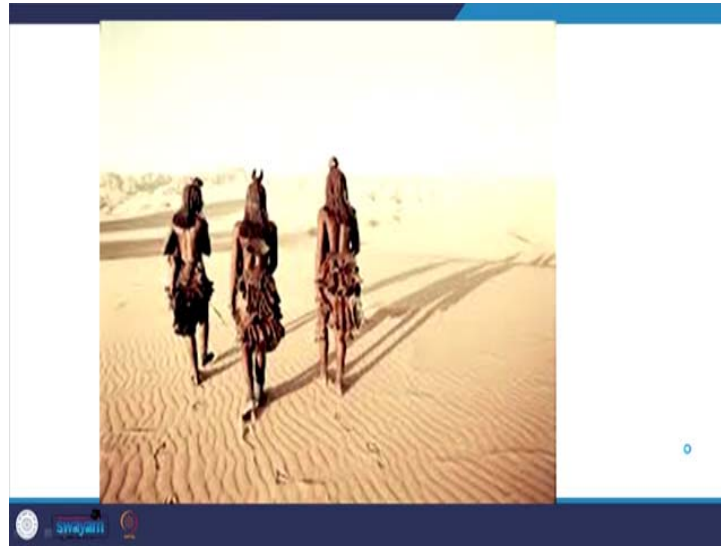


If you look at the colder regions, the way they cover themselves, the kind of resources that they use woolen clothes and mechanisms to keep themselves warm are common, they are similar.

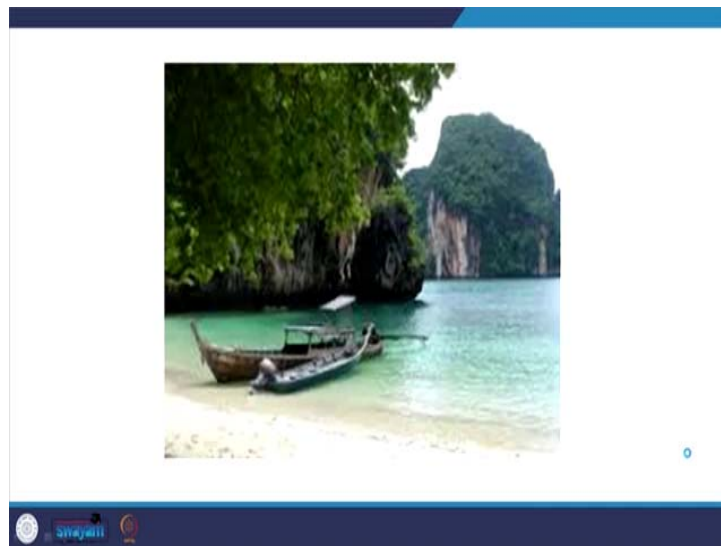
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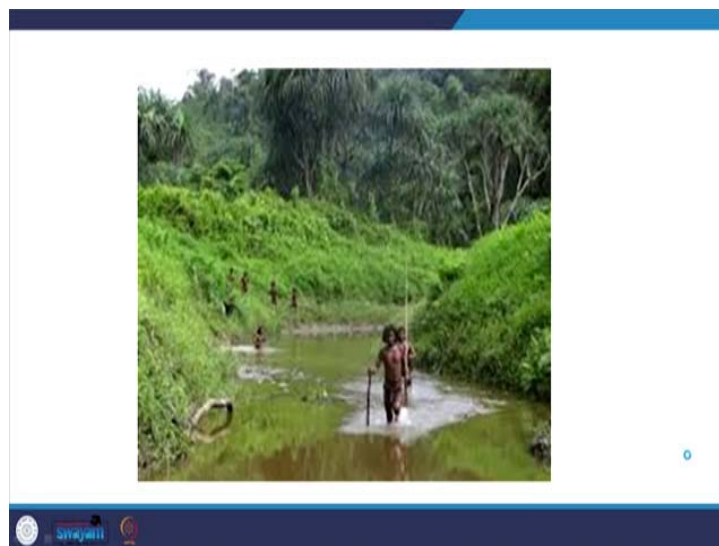
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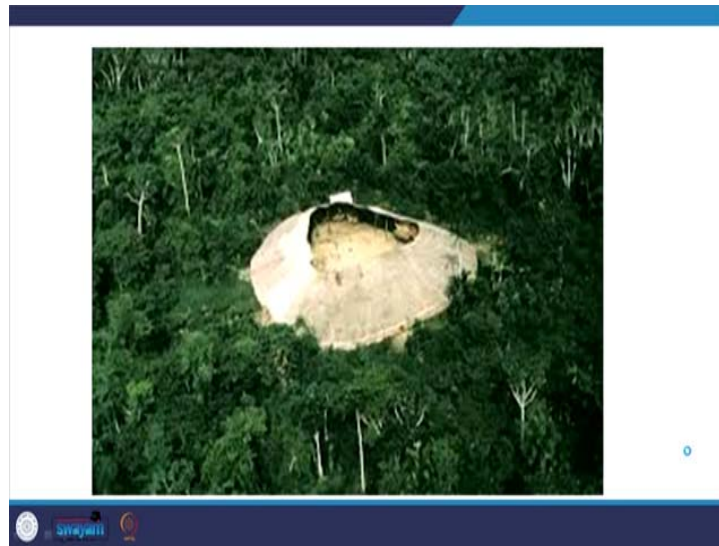


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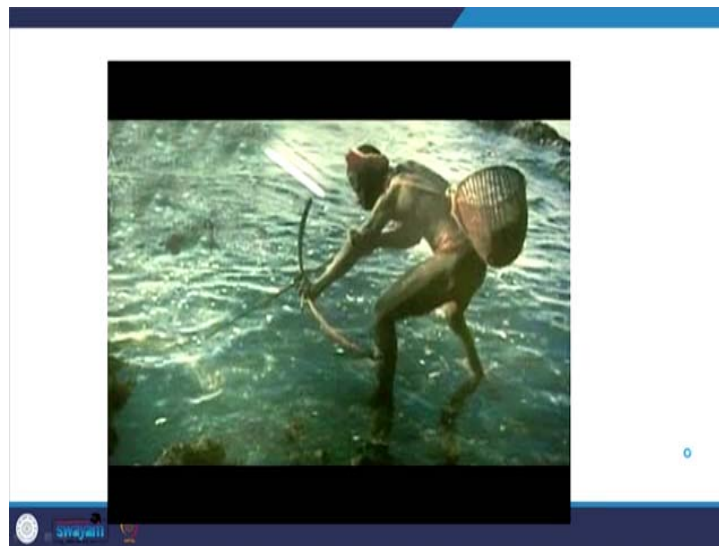
The responses in terms of architecture, the responses in terms of their food habits, the responses in terms of our clothing they are all very very similar.

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And this is simply reflecting the basic fundamental that humans were very connected with nature.

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And that is the reason we survived, we survived very efficiently.

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Now, each of these dress that the eskimos are wearing requires almost an year and half to make itself, but they do not have each eskimo does not have many dresses these fluffy suits that they are wearing, they do not have many of them. They realize the importance it is procured from one of the renders which died of which the meat is taken as the food, the fat is taken as fuel to light their homes to keep themselves warm inside their homes.

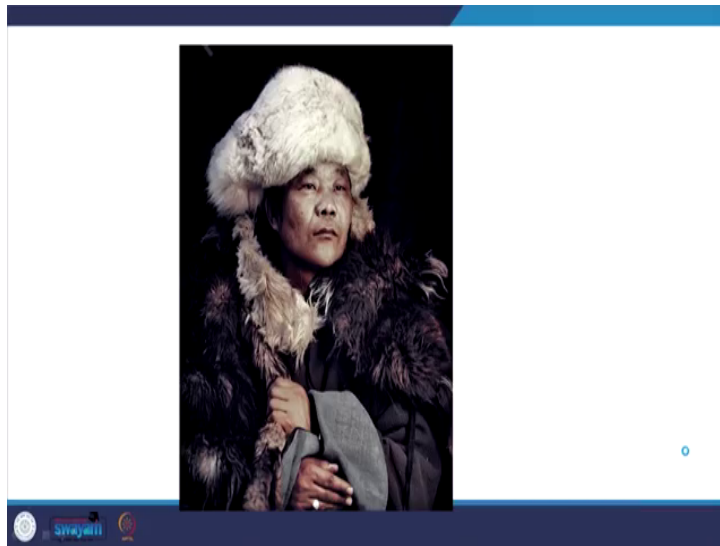
So, each of the life form a resource which is available around is not wasted it is interdependent, but even when it is available in abundance it is not abused, it is used and it is efficiently used. So, there is efficiency and it has they have adaptive, adapted themselves over time, they realized that they have severe cold around them, this is how they adapt to the surroundings adapt to their context.

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Look at any response of these early human beings and we see that they have a specific response to the context in which they are placed.

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Looking at any of these pictures that I have just shown you we can very clearly identify that this is a picture from a native tribe living somewhere in the ~~cold and regions~~ cold regions of the world. Looking at these pictures we can very clearly see that this is probably the tropical region. Looking at some of these pictures we very clearly know, understand this is the drier parts and their practices, the way of living everything reflects

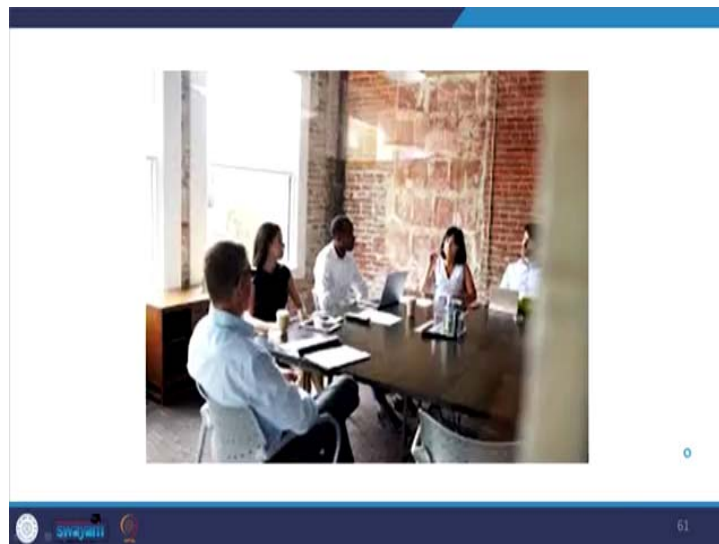
their context. So, another thing that comes to our mind is the context to which we are responding.

Now, if we were doing all that what is the problem, where is the problem that we see, why are we not able to carry on the way they were doing, ok. So, there are several reasons, several answers to this problem. One, which is the foremost and the major one is our population has exploded.

We will talk about it in subsequent lectures, but the problem is that there is a greater demand. There is a huge demand for resources because humans have increased they have overpowered all other life forms, all other species have been reduced greatly while we as human beings are just increasing in numbers, I would not use the word flourishing here because we are not really flourishing.

We are just increasing in numbers along with a lot of problems, physical problems, psychological problems, societal problems we are just growing in numbers. So, when we had such a wonderful past to look at the way humans responded to their context to their surroundings where is the problem right now in current context.

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So, this is one of the problems, major problems. Each one of us across the world has a notion of how we should live and this notion unfortunately is becoming globalized. We have to have the same types of houses, we have to wear the same types of dresses, we

have to eat the same kind of food even when it is not contextual at all. We are talking about ~~our~~ lifestyle problem, it may seem irrelevant when we are actually going to read a course like sustainable architecture, but actually the problem arises from there and also the solution to it is embedded in that.

So, we are looking at solutions which are global, ~~the in~~-ignoring our local context. We do not know we do not want to respond to the local context, we only want to look at the global solutions and which is solutions like this we have air conditioned buildings air conditioned spaces, we do not care what kind of climate are we living in all of us wear the same kinds of clothes throughout the year.

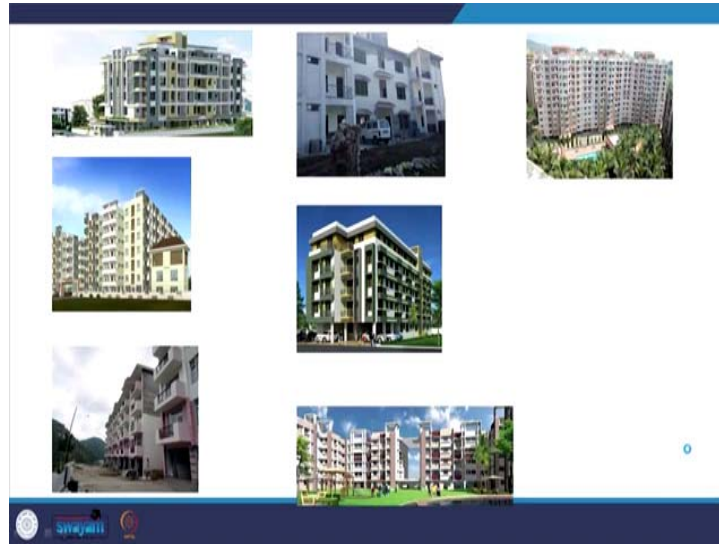
So, we have summers, we have winters, we have rains, but when we are in an air conditioned environment we are in the same kind of attire throughout the year. This photograph could be from anywhere in the world it could be from one of the very cold countries or it could be in highly warm tropical countries, it could be anywhere, it could be a desert, but this will be a typical photograph.

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This is what we are going towards we are moving towards and that is what is creating the major problem, ignoring what our local context is.

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And hence, since we have the same kind of expectation this is the kind of output we get in terms of architecture. Go wherever in the world, the same class of building, same category of buildings look the same I do not know where these photographs have been picked up from, I do not remember and I do not need to remember because they could be anywhere in the world. Same materials being used, we are using concrete, we are using brick, we are using steel, we are using glass, same types of materials are being used, same types of design responses are being used.

We see the same multi storied buildings which are just similar in design, irrespective of what kind of climatic context it is a response to, there is no difference so, that is what is causing all the problems. The problem is of the resources which are dwindling which are reducing which are going down, the increased huge demand which is common which is global, but instead of utilizing and responding to these problems through the resources which are locally available. The expertise which is locally available which we have acquired the skills that we have acquired over years.

We are looking for solutions which are global. We are procuring our resources from far off places instead of looking at what is immediate, immediately available to us in our surroundings that is causing greater problems. We are not responding to our immediate surroundings, I am not saying only environmentally, we are not even looking at the

context immediate context of society, we are not looking at the ~~immediate~~ ~~image~~ ~~at~~ context of economy, we are copying it from a global culture.

So, ignoring the environment, ignoring the people, ignoring the economy is actually giving rise to problems which can be categorized as unsustainable. So gradually, as we move on into the ~~course~~ ~~seeres~~; we would see what are these specific problems that we are talking about when we are talking about this un-sustainability as a larger problem, what are the specific problems of development of how humans are developing one. Second, we would be looking at solutions to that generic solutions.

We would also be looking at problems related to architecture specifically architecture and then looking at generic solutions to that and also specific solutions to that. The methodologies to arrive at those solutions the generic methodologies and also specific tools of arriving at these solutions.

So, that is all for the first introductory lecture, couple of next lectures next few lectures we will only be talking about the theoretical understanding of sustainability or sustainable development sustainable architecture as a concept before we really move into the specifics of this course. So, the first week we will largely be focusing on the common topics; hope you enjoy the sessions, hope you enjoy the course.

Thank you.