Conservation Geography
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Module - 11
Economic Geography and Conservation
Lecture – 33
Settlements

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Namaste! We carry forward our discussion on economic geography and conservation and in this lecture we shall have a look at Settlements.

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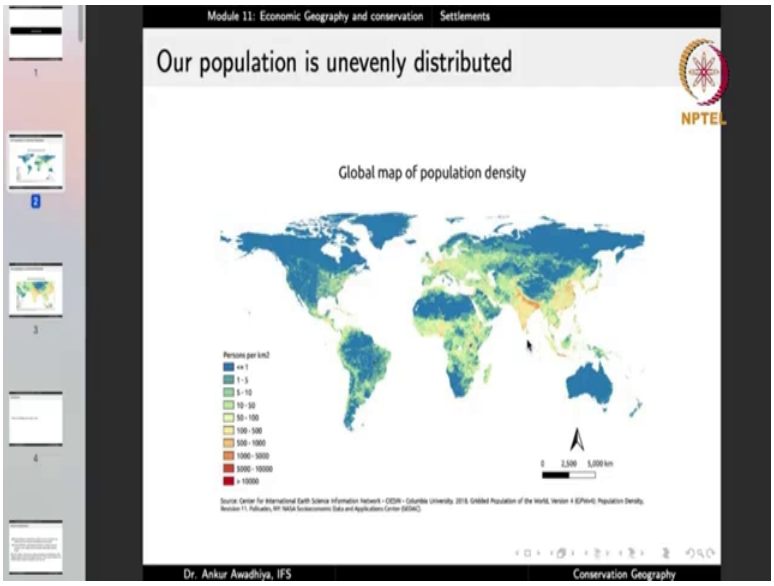

Now, we have seen before that the distribution of us human beings on this planet can be described as there are several places where the human beings are few and there are few places where the human beings are plenty. Now, if we look at the density of humans on different areas, we find that there are certain locations where the densities are very high, areas like India or eastern China, some parts of Europe, some parts in Africa, eastern U.S. and so on.

Whereas, there are very large areas where the density of human beings is very less areas like Alaska or Canada or Greenland or large spans in Russia or in Australia, the Sahara Desert, the rain forest areas in Brazil and so on. So, there are a few places where the humans are in plenty and there are lots of places where the humans are very few numbers. Now, this is at the global scale.

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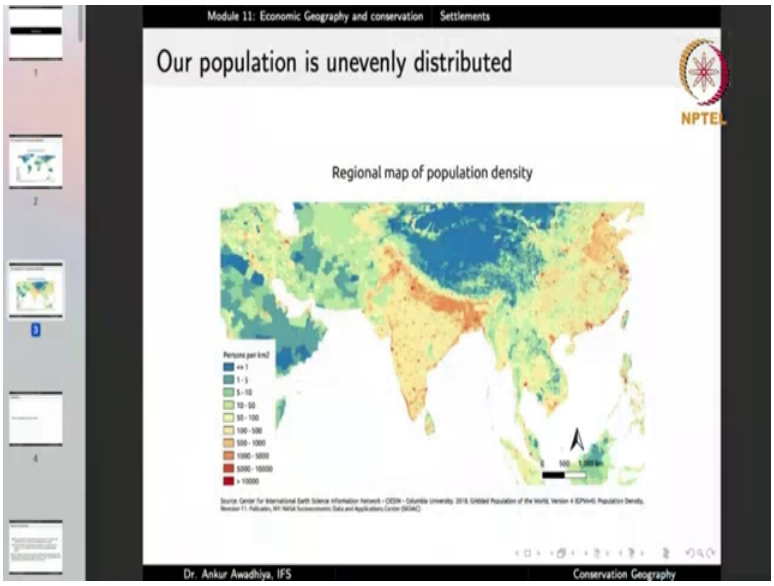

But even on a more regional scale, we find that our population is highly unevenly distributed. In our country India, we find that we have a very high population density in areas like Delhi or Mumbai or Kolkata or Chennai or areas like Bangalore and Hyderabad, the population density is very high. On the other hand, the population density in the Thar Desert is very less. The population density in the very extreme Himalayas is again very less. The population density in some parts of our plateau again is very less.

At the same time, the population density in the northern plains is very high, because primarily this is an agricultural belt. We have flat areas, we have a good climate, there is plenty of water, there is plenty of fertile soil and because of that these areas have a very high density of population. So, whether we look at the global scale or whether we look at the regional scale or probably even more local scales, we will find that the human population is unevenly distributed.

Now, if we have such a situation where the populations are concentrated in certain locations and in large areas we have a very less population density still then how are we able to impact the biodiversity and ecosystems to such a large extent. Now, this is what we are going to discuss in this lecture. So, we will look at what are the kinds of settlements that people live in, what are the kinds of issues that they face and how can we solve those issues, especially those that are related to the topics of conservation.

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Now, if we consider the locations where people live, we use the term settlement. A settlement is a cluster of dwellings of any type or size. So, it is a cluster, it is a collection of dwellings, dwelling means the living spaces, things like harts or houses and they can be of any type or size. So, we consider pakka houses, we consider kuccha houses, we considered large houses, we consider small houses, we consider touch houses, we considered harts, we consider everything. So, when we look at the dwellings of all types and sizes and when we look at their clusters, that is how they are arranged together, we are looking at settlements.

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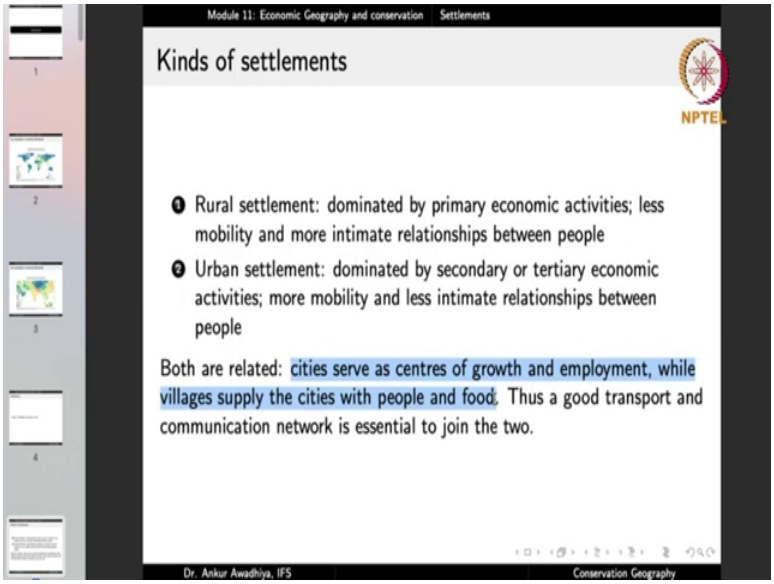

Now, settlements can be divided into rural settlements and urban settlements. Rural settlements are found in rural areas and urban settlements are found in urban areas. So, rural settlements are dominated by primary economic activities things like agriculture or things like mining. So, they are the primary economic activities. There is less mobility and more intimate relationships between people.

In the case of urban settlement, they are dominated by secondary or tertiary economic activities. Secondary economic activities is mostly the industries. So, they are the manufacturing sector. And tertiary economic activity is mostly the service sector. Urban settlements are typically have people with more mobility and less intimate relationships between people, more mobility, primarily because people are engaged in these activities that require movement.

So, you will find people who are shifting from one industry to another industry or they are going to different places because of their work and so there will be a large amount of mobility of these people. You will find people who are living away from the city and they are coming into the city into their workplace every day. So, they come in the morning, they go back in the evenings. There is a large amount of mobility. And we do not find such mobilities in the rural areas.

Now, because there is a huge amount of mobility, so typically the relationships between people are less intimate. We will do not know each other very well. And they are not related to each other in a clan setup, similar to what we find in a large number of rural settlements. Now, both of

these are related to each other. It is not that one is good or the other is bad. Both are related because cities serve as centers of growth and employment, while villages supply the cities with people and food. And thus a good transport and communication network is essential to join the two.

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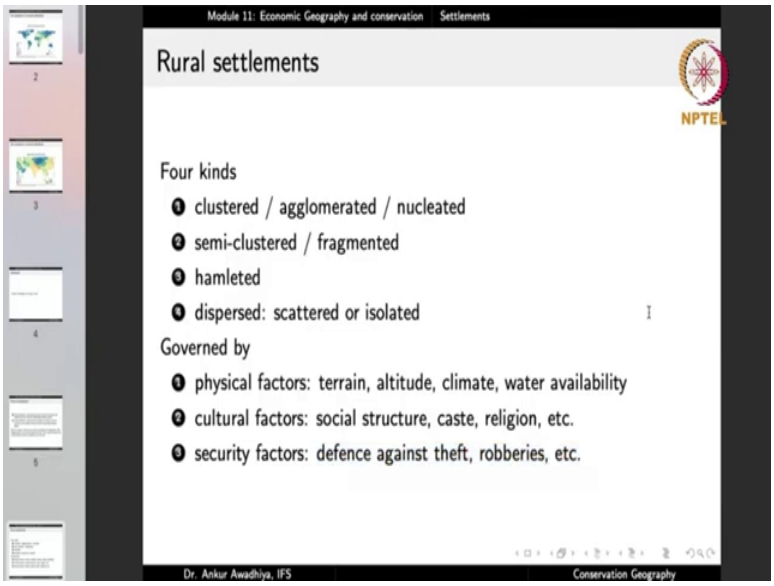

Now, if we look at her rural settlements, we have four different kinds of settlements. We can have clustered settlements also known as agglomerated or nucleated settlements. So, in these the houses are clustered together. On the other hand, we can have dispersed settlements, such as scattered or isolated settlements, where the houses are very far apart. We can have semi-clustered arrangements or fragmented arrangements, which are in between both of these. And we can also have hamlets. We will have a look at all of these in a short while.

Now, the kinds of settlements that will predominate is governed by the physical factors such as terrain, altitude, climate and water availability. So, for instance, if you have an area where there is only a single source of water, so perhaps there is a huge desert area and there is a single oasis. So, all the people would tend to live near this oasis. So, there will be a clustered sort of an arrangement near this oasis.

On the other hand, you can also have a situation where you have a hilly area and in this hilly area it is difficult for people to live together because of an uneven terrain, because of high slopes. And especially in those areas where you have a lot many small hills, you will find that there is a

house on top of one hill, another house on top of another hill, another house on top of another hill and so on. And in such a situation the houses will be dispersed, they will be far apart. So, the physical factors play a big role in the kinds of settlements that we will observe. So, physical factors like terrain, altitude, climate and water availability, govern the kinds of settlements.

The kinds of settlements are also governed by cultural factors, what is the social structure, religion, caste of people. Because in a large number of situations, we find that in cases of a very close knit social structure, people tend to live together. So, there will be more amount of clustering. Whereas, in those villages where we have people of different social structures, different religions, different castes, they may form small clusters amongst themselves, but these clusters may be a bit far apart from each other. So, you will have a semi-clustered arraignment. So, cultural factors also play a role.

At the same time, security factors also play a big role. For defense against theft and robberies in a number of cases the people have to come together to put up a joint defense. And in these cases, we will find a great amount of clustering of people. All the houses will be close together so that they can set up a common defense. So, we have four different kinds of rural settlements, which are governed by physical, cultural and security factors.

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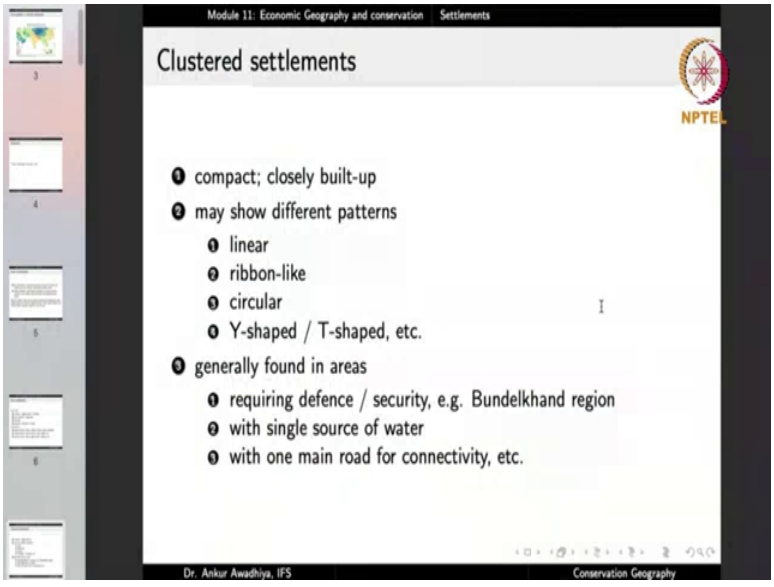

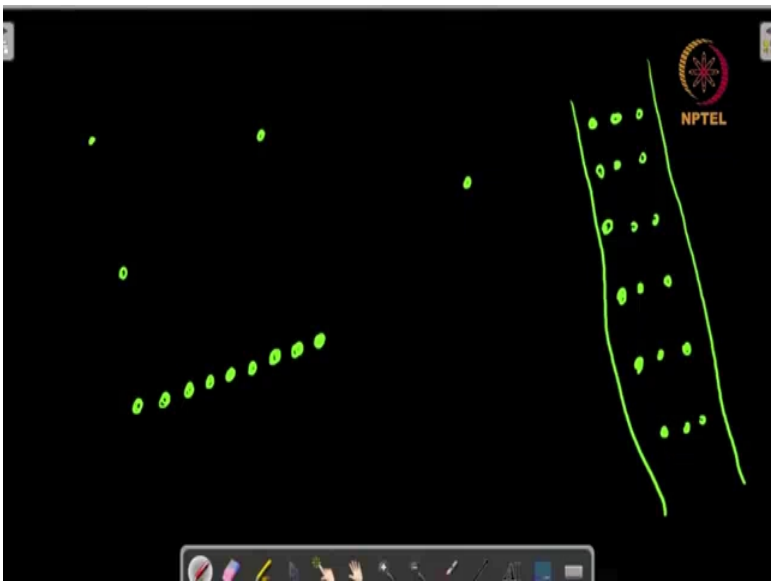
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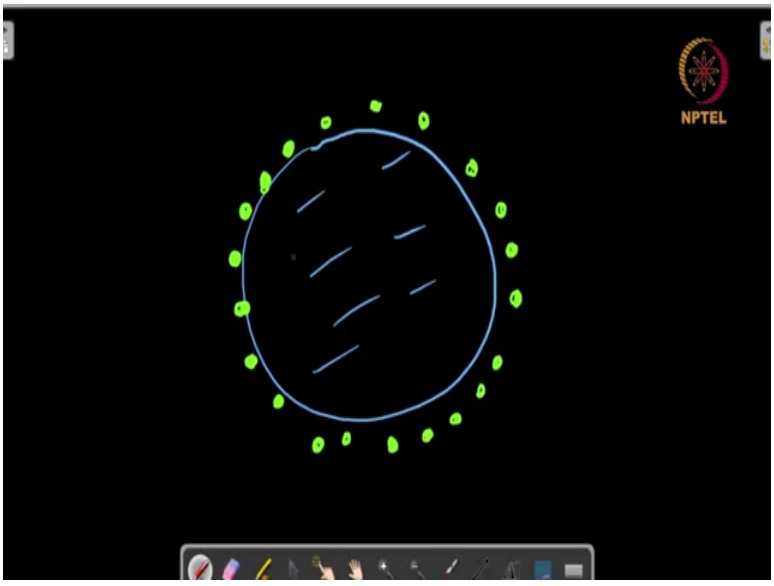
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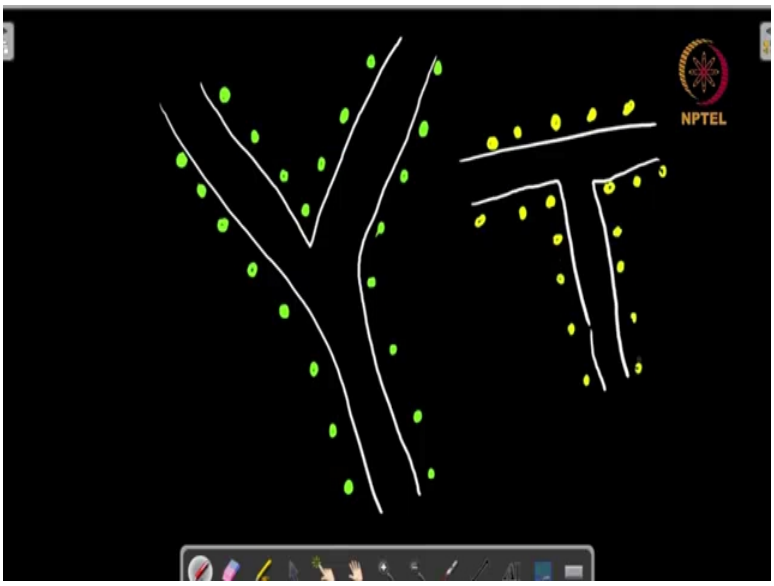

Now, the first settlement is the clustered settlement. They are compact. They are closely built up. So, the houses are close together. And when they are close together, they may show different patterns. They may be linear. That is all the houses are arranged one after the other. So, basically in that case you will have a situation where you have a house, then another house, then another house, then another house and so on. Now, this is a linear arrangement.

Now, here again you have a clustering, because all these houses are close together. You do not have a dispersed settlement like this. So, the houses are close together, but they are arranged in the form of a single line or you may have a situation where the settlements are ribbon like. A ribbon like settlement means that you will have the houses like this. So, here the houses are close together, but they are forming a ribbon like structure. It is not one line, but say a few lines of houses.

Or there may be a circular arrangement. Typically, around say a water body. So, if you have a water body, and otherwise this whole area is a desert area, so in this case, you will find settlements like this, because everybody wants to be close to the water body. So, here you will find a circular arrangement.

Now, this again is a clustered arrangement because the houses are close together. But in this case, the shape of the arrangement is governed by the presence of this water body or you can have a Y-shaped or a T-shaped structure and these are very common in areas that have roads. So, suppose you have a road and this road is diverging like this. And in this case, the houses will be

arranged like this. So, everybody wants to live close to the road. So, they are forming a clustered settlement, but the shape of the settlement is being governed by the shape of the road. So, in this case the houses are in a Y-shaped structure.

Similarly, if you have a T-shaped road, something like this, so here the houses will be arranged in a T-shape. So, the houses are close together on both sides of the road, but because the road is in a T-shape so the settlement is also in a T-shape. So, these are different examples of clustered settlements. They are generally found in areas that require defense or security, such as in our country we find clusters settlements in the Bundelkhand region.

Now, in the Bundelkhand region typically it is a dry region and it has been infested by dacoits and robbers for quite a long period of time. Now, in such situations, because people had to put up a joint defense, they tended to be close together. So, they formed clustered units. They are also found in areas with a single source of water or with one main route for connectivity and so on.

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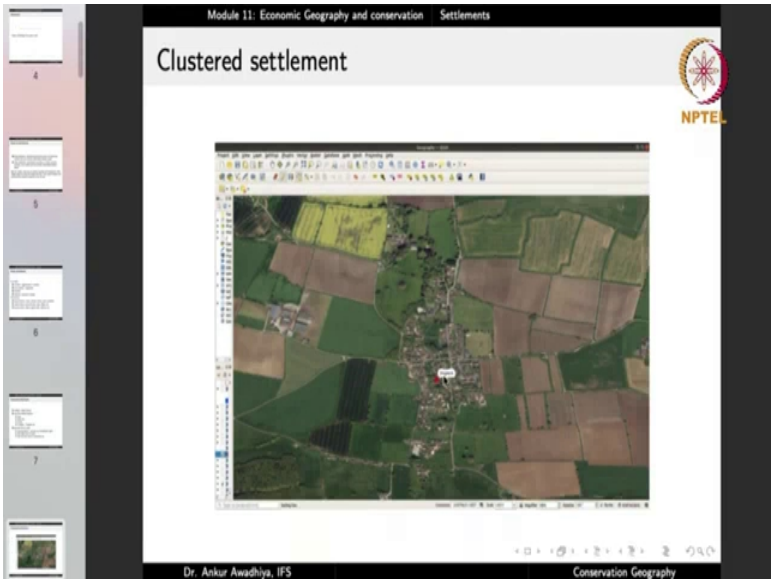

So, this is how a clustered settlement will look like. So, in this case, this area has all the houses that are close together and these are surrounded by large spans of fields. So, in place of having a house here, a house here, a house here, a house here and so on, all the houses are close together. So, this is a cluster. So, this is a clustered settlement.

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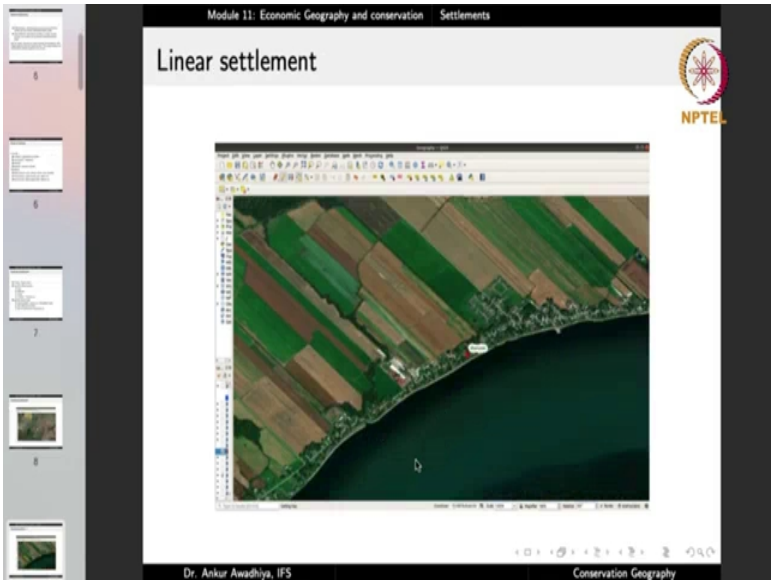

This is a linear settlement. So, you have this water body and all the houses are arranged in a line near this water body. So, this becomes a linear arrangement.

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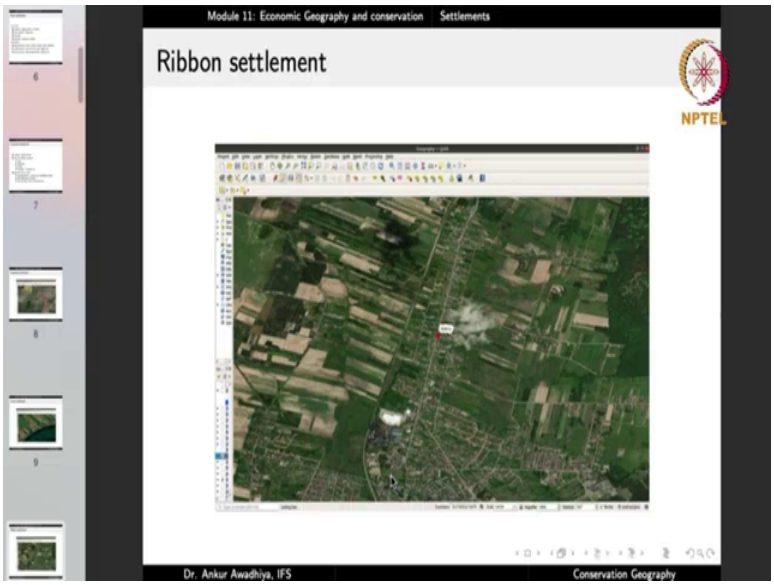

This is a ribbon settlement, because you have these roads and people are making their houses on both the sides of the road to a certain distance. And so you find houses in all of these areas. So, now, this looks like a ribbon from here to here and this is a ribbon settlement. We typically find ribbon settlements on very longish roads.

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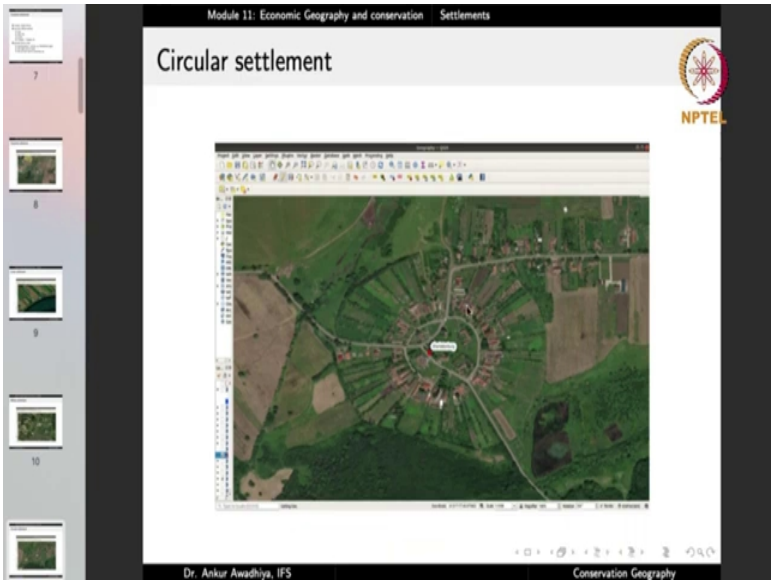

This is a circular settlement. So, this is a hill and all the houses are arranged on one elevation. So, this is a circular settlement.

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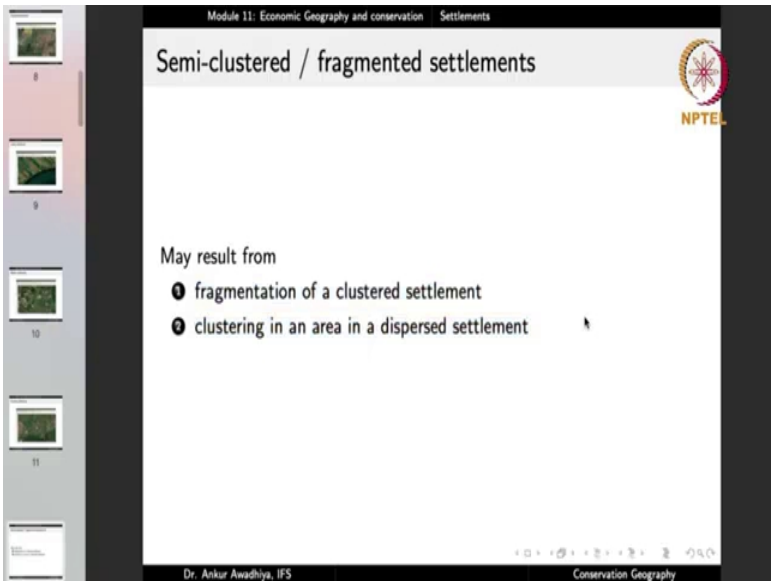

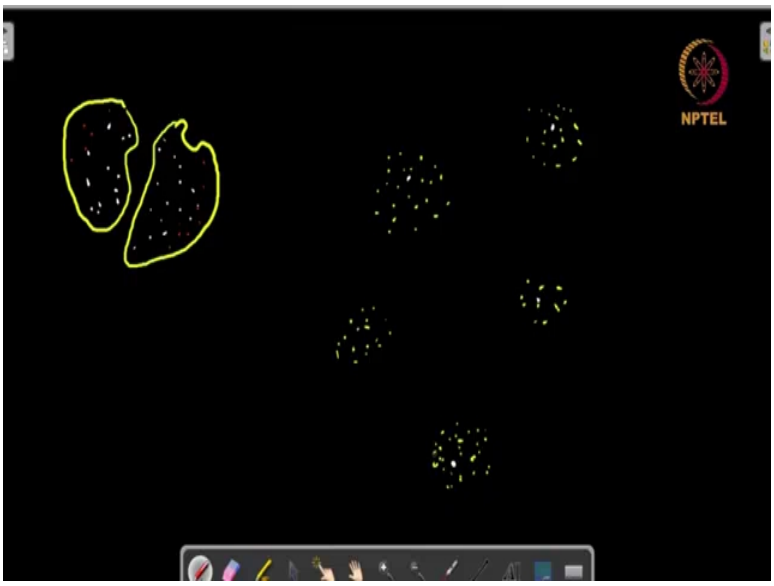

Then we can have semi-clustered or fragmented settlements. And this semi-clustering of fragmentation can occur because of fragmentation of clustered settlement. Meaning that earlier there was a clustered settlement and then it broke apart. Or we can have clustering in an area of dispersed settlement. That is we began with a dispersed structure and slowly and steadily there was clustering that happened. Which means that we can have a situation where the houses are close together, but then because of some reason, the people who were living here they shifted away and they made their houses here.

So, now, you are seeing two different fragments. So, a cluster has been broken into two different fragments. So, this is one fragment and this is another fragment. We typically observe such a situation where you have a village which was earlier a clan village and then the clan split into two different factions. And so now the people are living apart.

Or you can have a situation where we begin with a dispersed nature of settlement. So, earlier people had their houses like this. Now, with the passage of time, the children of this person would make their houses nearby. And after a few generations, we will find that this is one cluster that has developed. This is another cluster that has developed. This is yet another cluster. This is yet another cluster. So, we began with a dispersed settlement, but with the passage of time there is some amount of clustering that has happened.

So, now, in this case, we do not call this a clustered settlement, but this is a semi-clustered settlement, because it is showing the properties of both a clustered settlement and a dispersed

settlement. There are different fragments. So, it may result from the fragmentation of a clustered settlement or from clustering in an area in a dispersed settlement.

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A good example is this village in Haryana, where we find that all the people who belong to the Jaat and Brahmin community they live together. All the people who belong to the OBCs they live together in these two fragments. All the Muslims live together and all the Harijans live together.

Now, this is a semi-clustered arrangement, because people are living in clusters, but then you can make out that these clusters are separated from each other. It is not just one unit, but you have divided the village into different fragments and each fragment is being occupied by people of a certain religion or people of a certain caste. So, this is an example of a semi-clustered arrangement.

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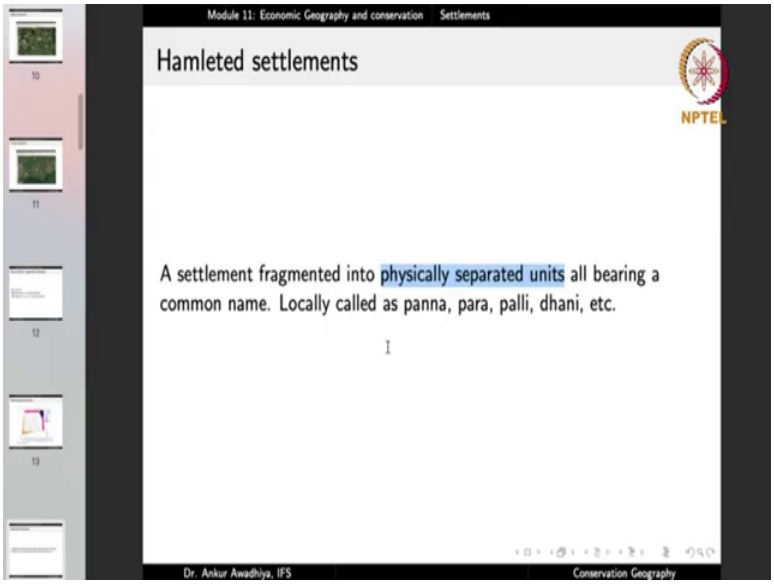

Then another arrangement is hamlets. A settlement that is fragmented into physically separated units all bearing a common name. So, here you have a settlement which has been fragmented into physically separated units. In the case of a semi-clustered arrangement, we do not have a physically separated unit. You can just make out by looking at the houses or by talking to people that okay people of a certain community are living together.

But in the case of hamleted settlements there is actually a physical separation between the units and all of them bear a common name. Locally they are known as panna or para or palli or dhani and so on.

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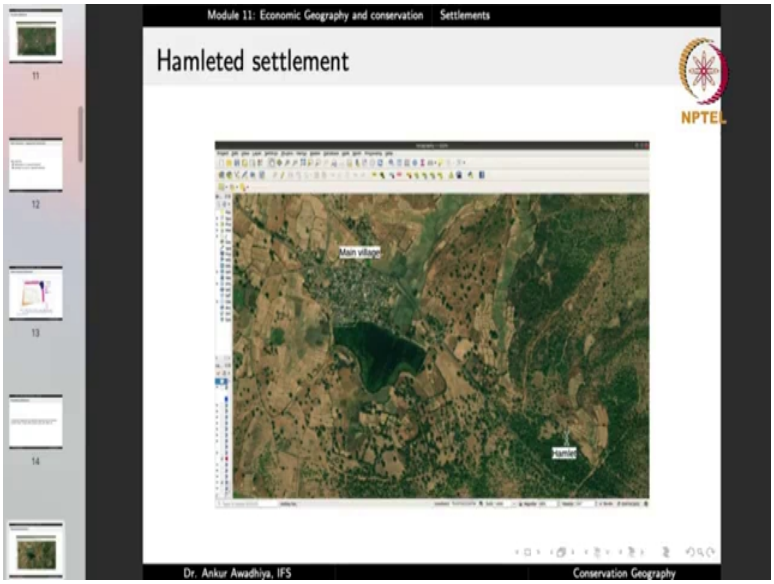

This is one example. You have this main village and you have this small Hamlet in this location. Now, there is a name for this village and the name for this Hamlet will not be a different name. It will just be a dhani of the main village.

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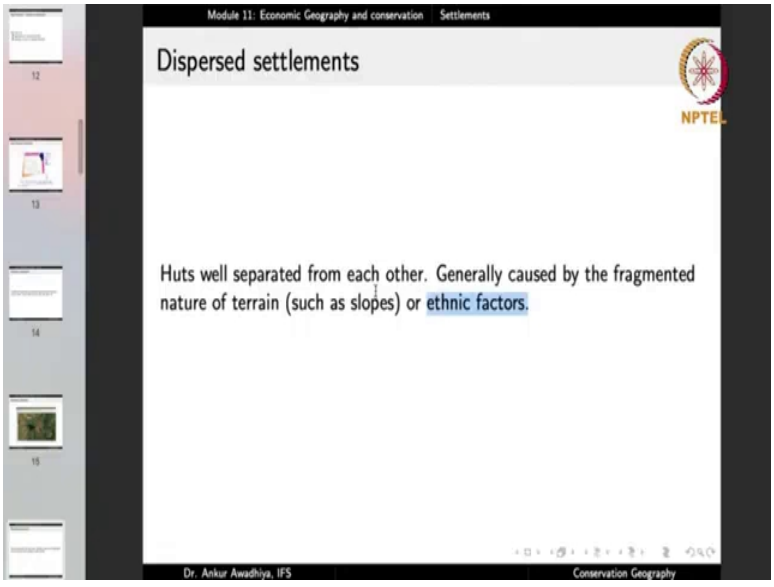


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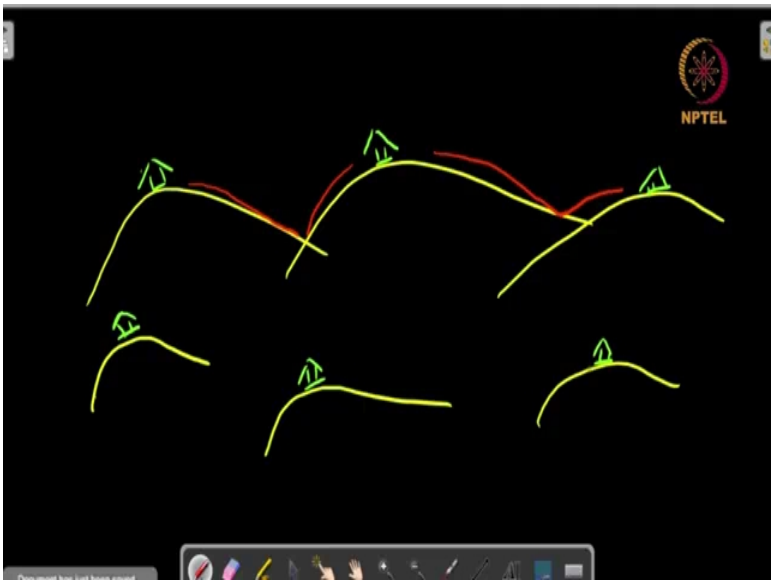
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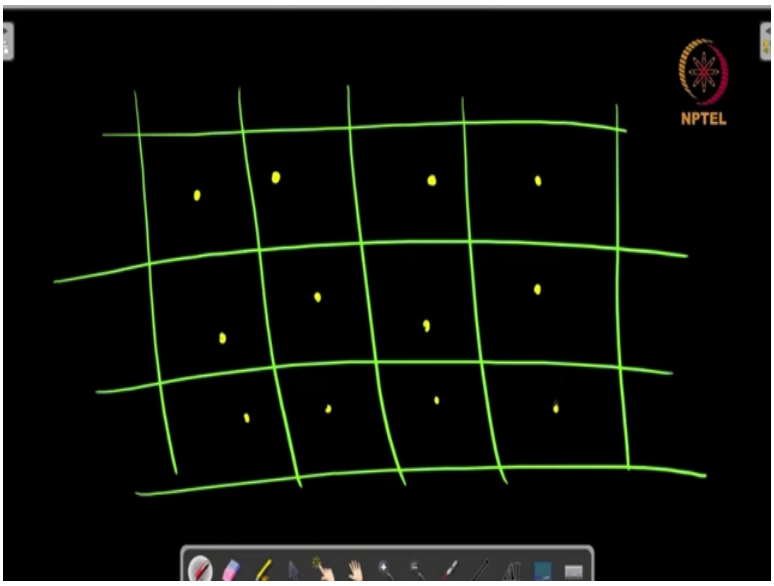

And another extreme is the dispersed settlements, where the huts are well separated from each other. They are generally caused by the fragmented nature of terrains such as slopes or because of ethnic factors. So, in this case, you have a situation where the huts are very far apart. So, the people are not living together and they have their houses that are very far apart. This can be seen in the case of very sloppy regions, because in the case of slopes or especially in the case of small hills, it is difficult to construct a large number of houses together. So, the only option that remains is to construct a house where ever it is possible.

And so you will find that if especially in areas that have say small hills. And in this case there will be a house on the top of this hill, there will be house on top of this hill, there will be a house on top of this hill, but the slope areas they will not be having any houses, because it is difficult to construct a house in a sloppy area. So, you will find that you have a large number of huts, but these huts are away from each other and this makes for a dispersed settlement.

Or you can have certain ethnic factors, because of say certain cultural factors or certain social factors, people just do not want to live together. You will find certain situations in which people have very large sized farmlands. So, for instance there is an area that was settled by the government and the people were given rights, homestead rights. That is they can own a piece of land, they can do farming there and they can also construct a house in that particular piece of land.

Now, if it so happens that way back in history, the whole area was divided into these small fragments and one person was given the ownership of each of these small patches. And so they all construct their houses like this. And in this case, the houses are very far from each other because everybody is constructing a house in the center of their field. And if the size of fields is large, then you will have a situation where the houses are very far apart. And so this will become a dispersed settlement.

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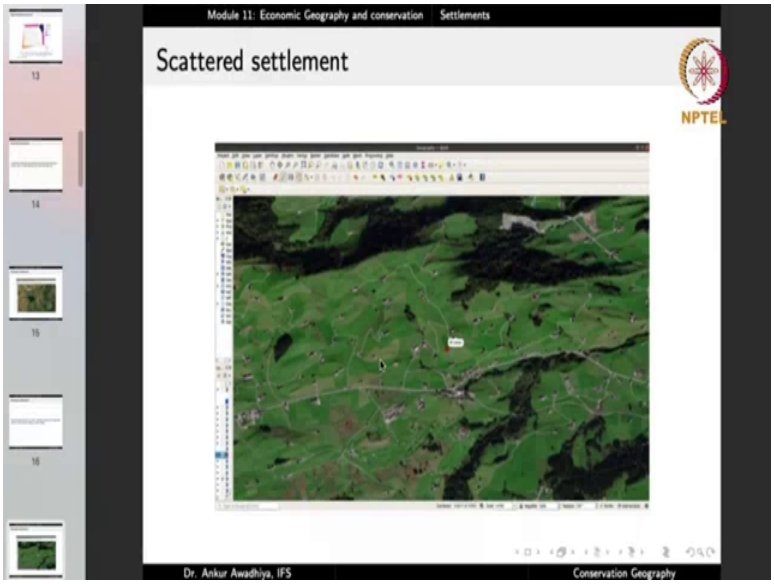

This is an example from Switzerland. So, here you can find that there are so many fields and all of these houses are very far apart from each other. So, this is an example of a scattered settlement.

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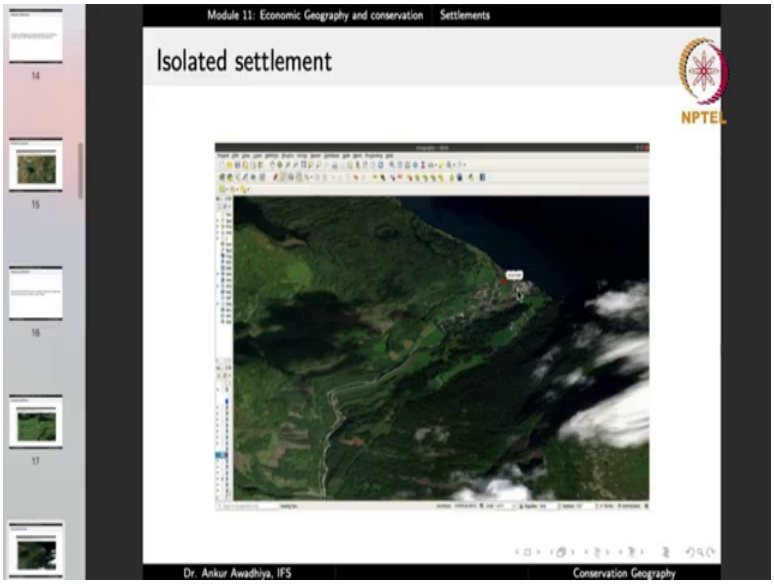

Another example is an isolated settlement. So, here you find this settlement and for a very long distance you do not find any other house. So, you find a few houses here which are isolated in the whole landscape. They do not have any neighbors. So, these are examples of the scattered settlements or the dispersed settlements.

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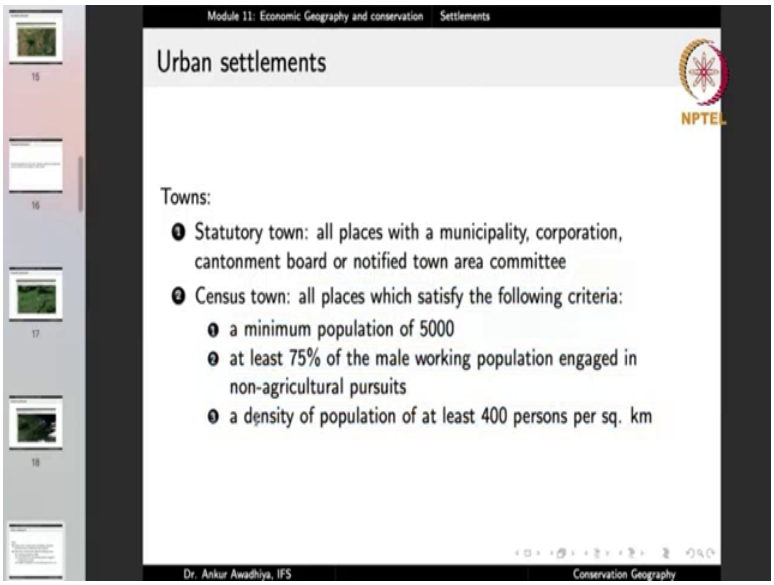

Now, if we talk about urban settlements or towns, we can have two different categories of towns. We have statutory towns which are legal towns. It means that all places with a municipality or a corporation or a cantonment board or a notified town area committee is a town. So, how do you

define a town? If any area has a municipality or a municipal corporation or it is under a cantonment board or it is a notified town area committee then we say that this area is a town. So, basically, these are the larger sized villages that have been notified legally to be a town and so we say that these are urban settlements. Or you can have census towns.

Census towns are the towns that we define based on the census characteristics. So, in India, we have all places that satisfy these conditions; one a minimum population of 5000. If the population is less than 5000, we would not call it a town. We will just call it a village, a large village. But if the population size is large, we will say that this is a town. At least 75 percent of the male working population engaged in non-agricultural pursuits.

So, here we are saying that in the case of an urban settlement, because the secondary and tertiary sectors dominate, so if in an area more than 75 percent of the male residents are involved in secondary or tertiary sector of the economy, we will say that this is a census town. Now, where will you get this data from? You will get this data when there is a census of population, because that will tell you what is the population size, that will tell you what is the occupational structure of people. Or an area with a density of population of at least 400 persons per square kilometer.

Now, this again is a piece of information that we get from the census. So, we define these areas to be towns based on certain characteristics about which the information is discerned from the census. And so we call this as a census town. So, we can have statutory towns which legal towns with certain characteristics or we can have census towns based on data from different census.

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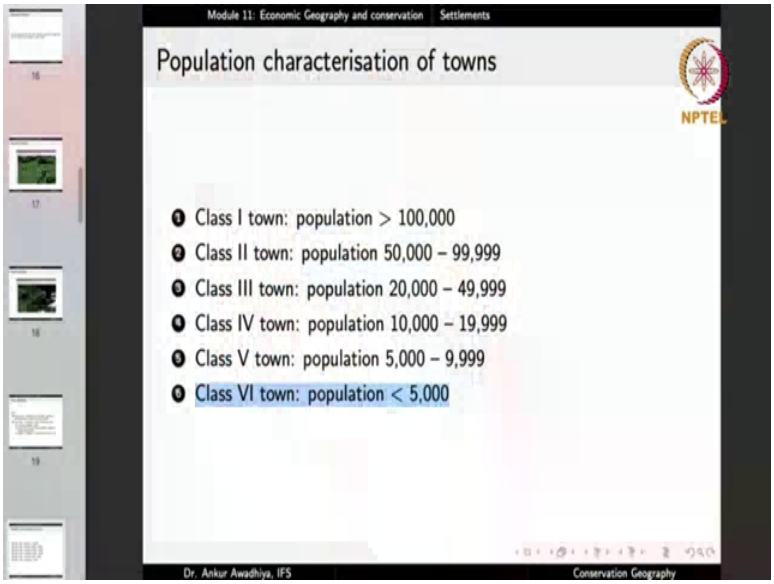

In India, we also define the towns or we classify the towns based on the population characteristics. So, a Class I town is one with a population of more than 100,000 people. So, anything about 5,000 is a town, but it can be from 5,000, it can be a very large population, because we have only set up a lower limit. So, anything above 5000 is a town. And we will say that if an area has a population of more than 100,000 people, it is a Class I town.

Anything between 50,000 to 100,000 we will call it a Class II town. Between 20,000 to 50,000 it is a Class III. Between 10,000 and 20,000 it is a Class IV town. Between 5,000 and 10,000 it is a Class V town. And less than 5,000 that can also happen because if the area satisfies other conditions, that is it has a high population density and the people are arranged in non-agricultural pursuits then we will say that this is a town even though the population is less than 5,000, and in that case, we define it as a Class VI town.

So, this is another way in which we can classify the towns. So, we have looked at the statutory classification, we have looked at the census classification and we have looked at the classification of towns based on the population size.

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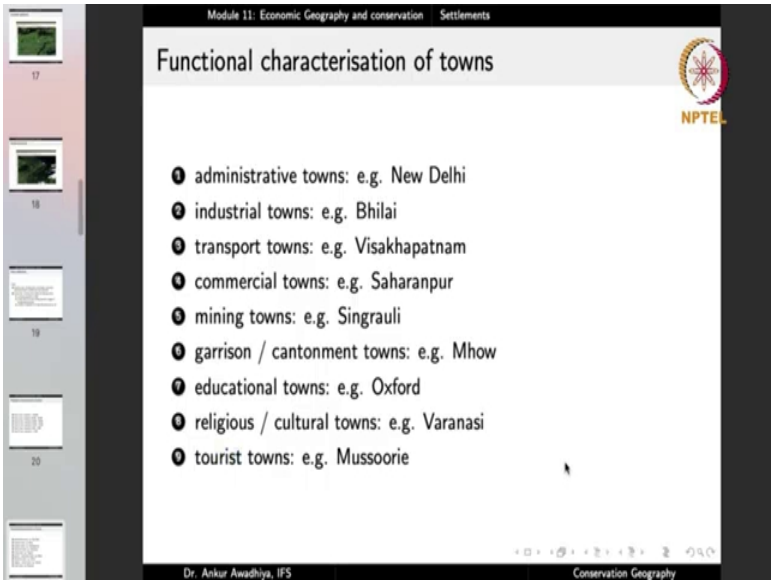

Yet another classification is a functional characterization of towns, which is what is the major function of this town. So, there can be certain towns or cities that are administrative in nature. The main function of that town is administration, typically, the capital cities, cities like New Delhi. So, these are administrative towns.

Or we can have industrial towns that are more or less dependent on or characterized by one particular industry such as our steel plants. So, in this town of Bhilai most of the people are engaged in occupation that are related to the Bhilai steel plant. And so we call Bhilai as an industrial town. It will also be having certain administrative functions, but the predominant characteristic of the town is related to its industrial aspects. So, it is an industrial town.

Similarly, we can have transport towns, towns especially, that are port cities like Visakhapatnam. Their main function is transportation. Or we can have commercial towns like Saharanpur, mining towns like Singrauli, garrison or cantonment towns such as Mhow. Now, Mhow the full form stands for military headquarters of war. So, even the name of this town has connotations with its military nature. So, these are garrison or cantonment towns. Towns like Jalandhar they are cantonment towns.

We can have educational towns which are more or less concentrated on the educational activity, towns like Oxford. Now, Oxford is known for the Oxford University. So, the primary characteristic of the town is governed by its nature as an educational town because of the

presence of Oxford University. Or we can have religious and cultural towns with religious and cultural connotations such as Varanasi. Or we can have tourist towns such as Missouri, whose main function is to cater to tourism.

So, these are all different functional characteristics of towns. We can have administrative, industrial, transport, commercial, mining, garrison, educational, religious and cultural or tourist towns or in certain cases we can even define a few other classifications of these towns.

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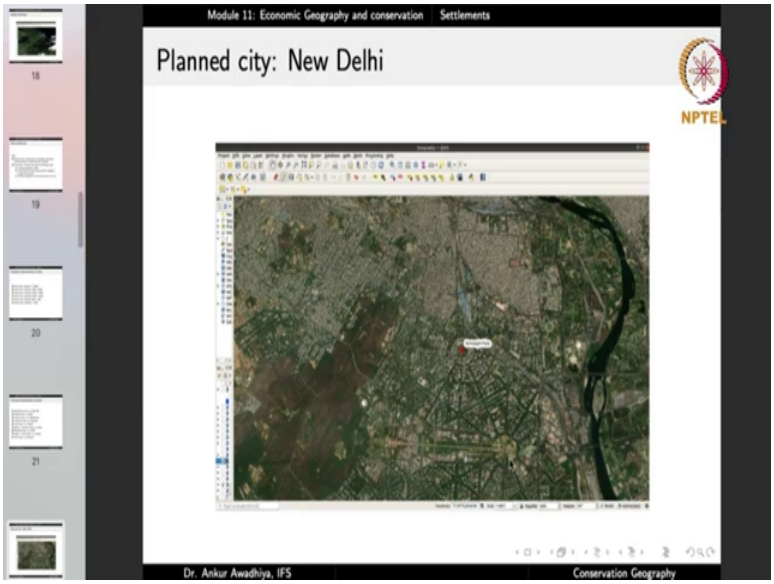

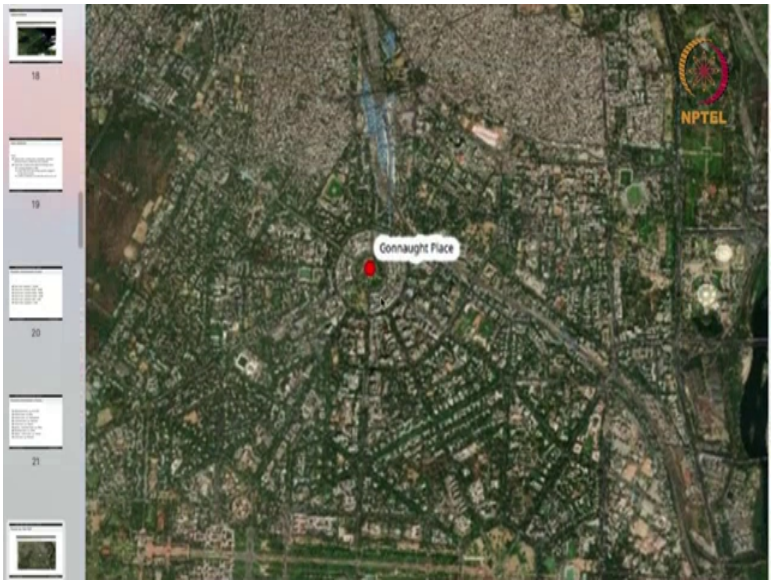

Similarly, if we have a look at the construction of the towns or the planning of the towns, we will find that certain towns are planned. So, for example, if we have a look at the City of New Delhi,

we find that there is a very regular ordered arrangement. So, we find that there are these hubs around which we find these spoke like structures. So, you have these central areas like Connaught Square and you have these roads that are moving in all different directions and these areas are divided into all these different sectors. So, this looks like a very planned arrangement.

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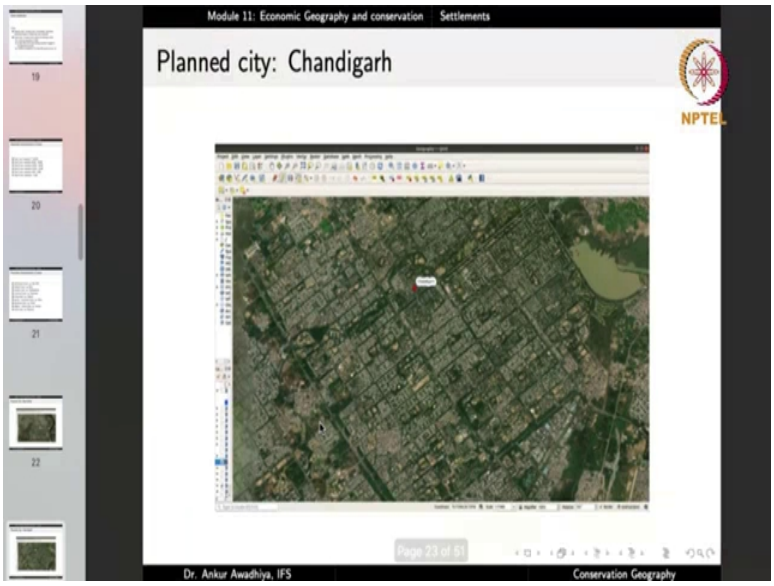

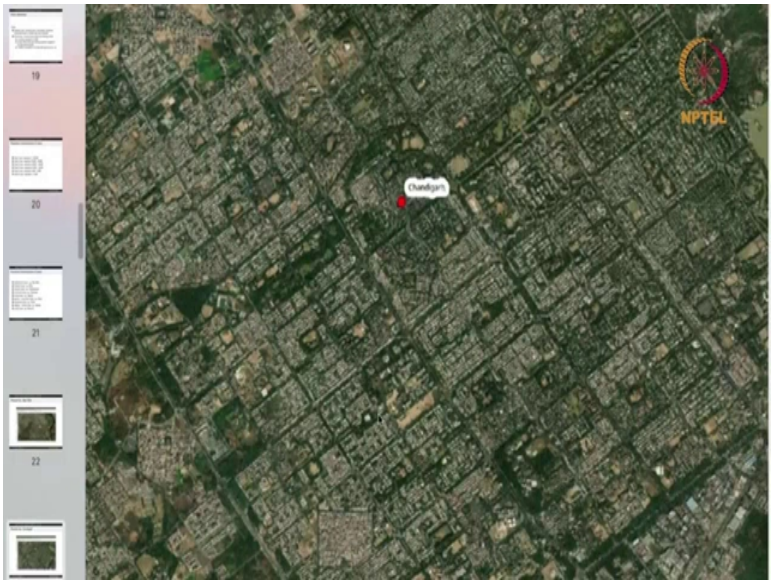

And similarly, if we have a look at the city of Chandigarh, we find that we have a very sectored arrangement. So, in the city of Chandigarh you have all these different sectors and the houses are arranged in a very planned manner.

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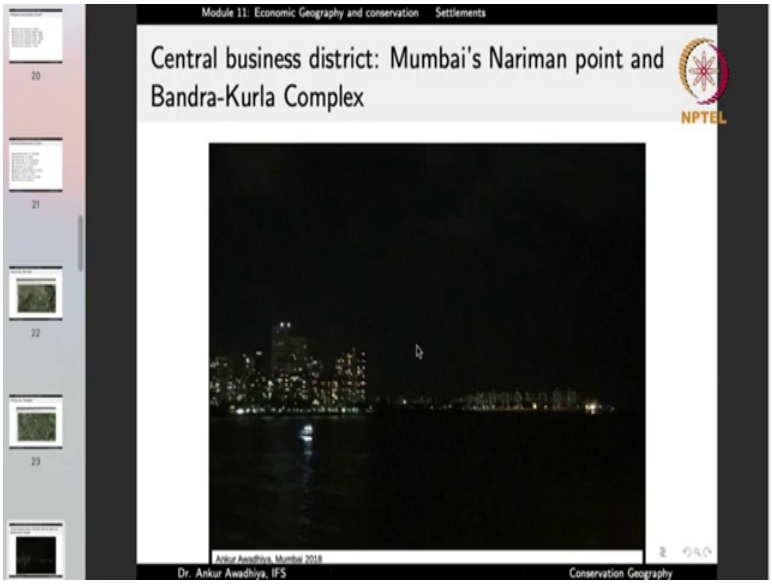

In many cities we also have a central business district, which is the place where most of the business entities are located. For example, in the case of Mumbai we have the Nariman Point under Bandra-Kurla Complex. So, there will be certain amount of arrangement in different cities, there will be certain amount of planning, there will be certain locations where certain entities are located and people will be flocking to these areas, especially in the office hours. So, this is how the cities are arranged.

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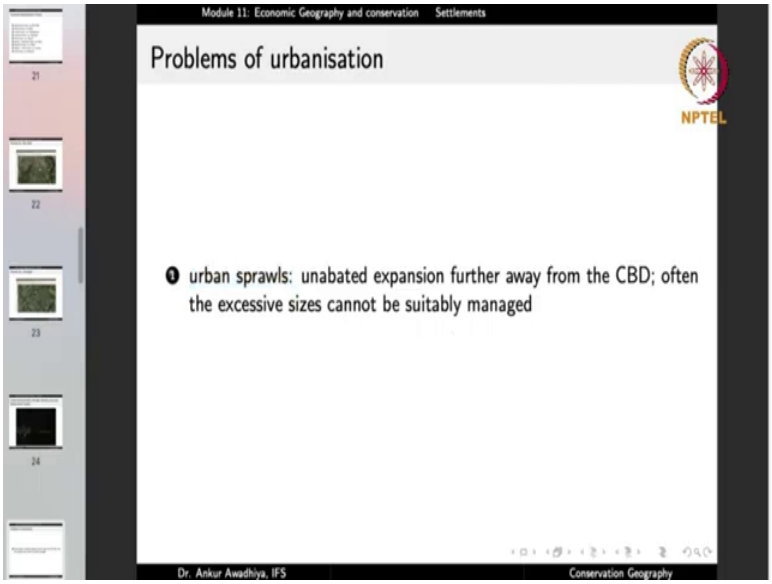

But with our growing populations and with growing urbanization we are now witnessing several problems of urbanization, problems such as the urban sprawls. Urban sprawls are the unabated expansion further away from the central business district, often of such excessive sizes that cannot be suitably managed.

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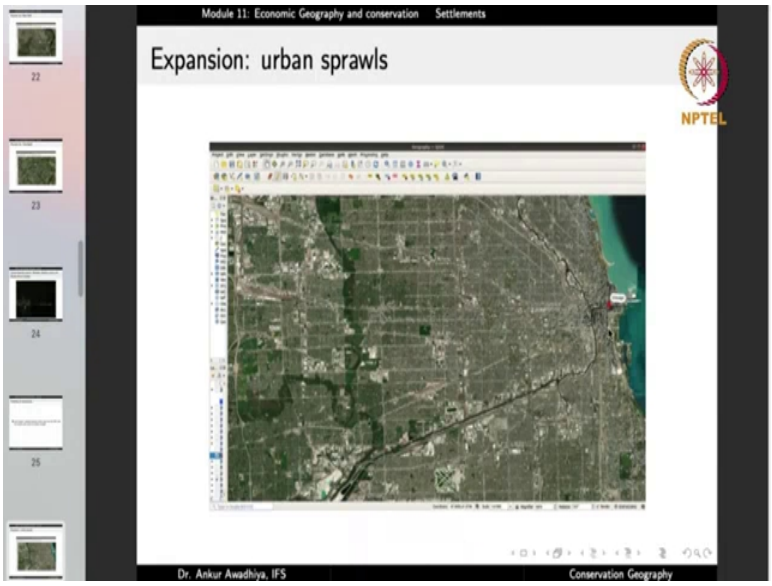

For example, if you look at the city of Chicago, we find that this whole area is an urban sprawl. So, certain areas will be planned to certain extent, but here you can observe that you do not have a very squarish arrangement, you have this line that is going like this, you have a line that is going like this. In these areas, the planning is even less observed. So, while, the central business district has its own importance, but because of increased prices the urban sprawls happened and they at times become problematic for the urban administrators.

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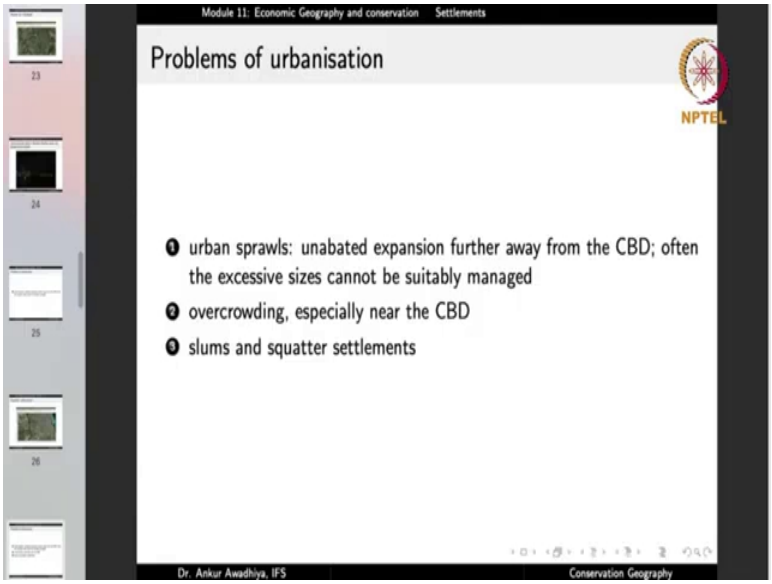

With this, we come to the second problem, overcrowding, especially in the central business district. Now, the issue here is that if you live close to the central business district, you will have to travel less, because your office will be closed by. So, you save money on transportation and you save your time. But if you live away from the central business district, then you will have to travel a lot.

So, there are two kinds of peoples. Certain people prefer living close to the central business district, even though it is very expensive, even though it is very highly polluted, because so many vehicles will be coming into this area every day. So, there will be lots of air pollution, there will be lots of sound pollution. But still they prefer living there, because their offices are closed by.

And when that happens, we find that there is a very heavy concentration of people near the central business district, because for a large number of people traveling time becomes a bit too much and the cost of traveling also becomes a bit too much. And with that we find an issue of overpopulation or a very high population density near the central business district. So, this is another problem of urbanization.

Yet another problem is the development of slums and squatter settlements. So, this is another issue of urbanization.

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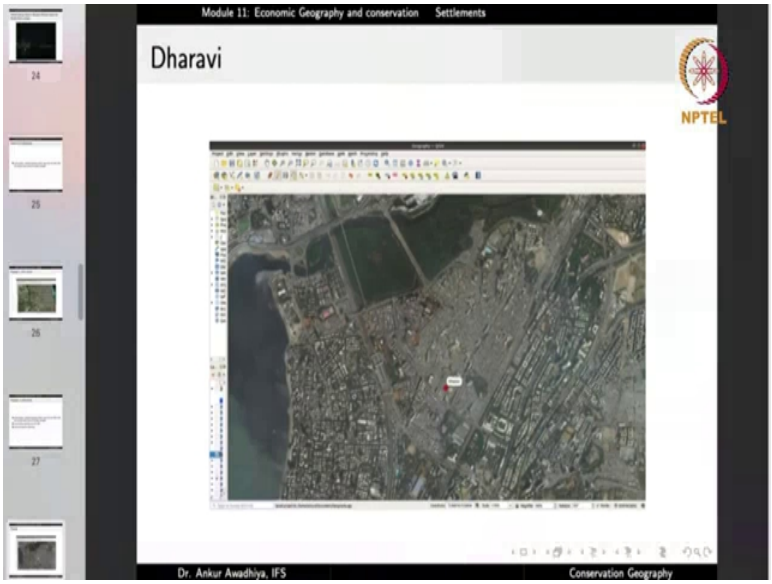

Especially in our cities like Mumbai, we have the slum of Dharavi, which is a very highly populated area with lots of squatter settlements.

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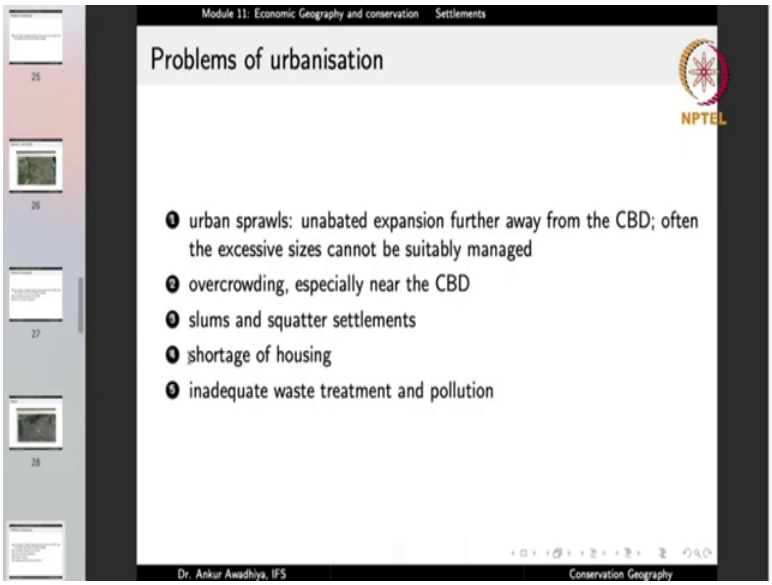

So, there is a shortage of housing, often there is inadequate waste treatment and pollution.

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Now, urbanization needs to happen because people have aspirations. The rural sector can only accommodate so many people. And the rural sector can only provide so many opportunities because it is primarily devoted towards the primary economic activities. But the secondary and tertiary sectors find dominance in the urban areas. So, people want to come to urban areas for better employment, for better salaries, for better working conditions, for better job security. So, people want to shift to urban areas.

And we have seen that the urban areas also have a limit on the number of people that they can accommodate. If you cross this limit, you move into urban sprawls or you move into squalid settlements. So, what is the way out? One way out is to develop cities that are sustainable, cities that use less resources, cities that do not pollute as well. And what are the options that we have? How can we make our settlements more sustainable, especially from the point of view of conservation, because if you are polluting the environment, it is going to come back to you.

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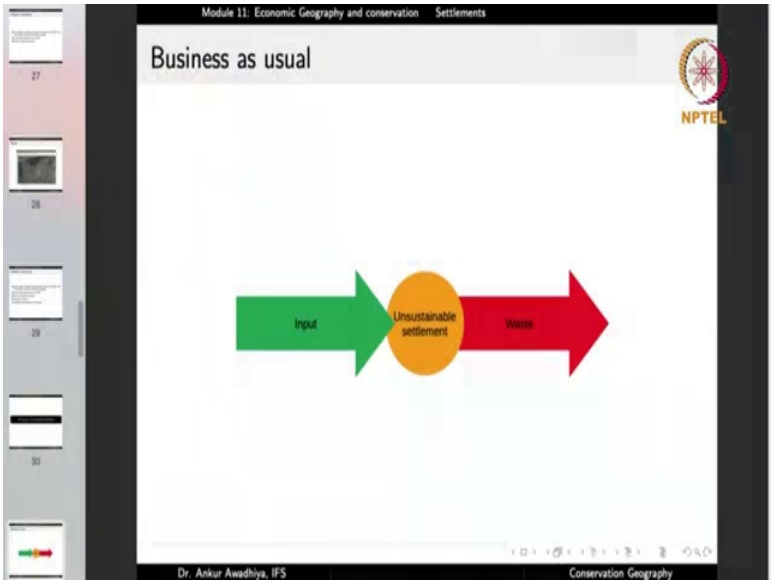

Now, the current way in which most of the cities are acting, which is the business as usual, is that you have an unsustainable settlement and the settlement needs lots of inputs. So, the people who are living in these areas they require food, they require clothing, they require electricity, they require means of transportation, they require a lot many resources. So, there is a lot of input that comes into the city. And once this input is used, it becomes a wastage. So, there is a lot of waste that goes out of these cities, things like plastics, things like rubbish, things like garbage, all of them are going out.

And the settlement is unsustainable, because the large amount of resources that it needs cannot be provided in a sustainable manner. If you use very much, very high quantities of electricity, where is this electricity going to come from? If you generate more and more electricity using say thermal power plants, you are polluting the atmosphere, you are emitting greenhouse gases, so that cannot be sustainable. Similarly, the unsustainable settlements release lots of waste. So, where will this waste go?

You cannot just go on creating landfills, because land is again in short supply. If you do not put your waste into a landfill, if you do not treat your waste, then probably your waste will make its way into the forest areas or it will make its way into the oceans and then it will kill the biodiversity in those areas. So, if we want to make our settlements sustainable, we have to cut down on the inputs and we have to cut down on the wastage.

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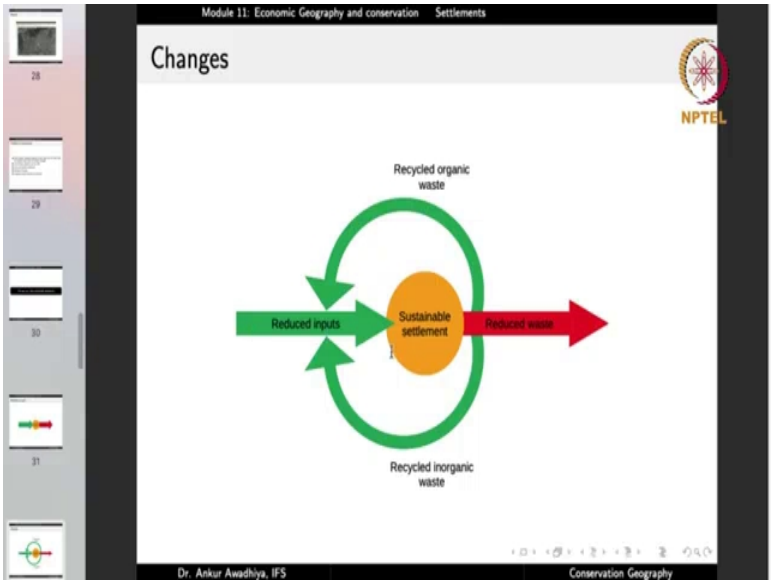

So, the idea of a sustainable settlement is that the settlement takes reduced amounts of inputs, generates reduced amount of waste and the waste that is generated a part of it is recycled and the organic waste gets recycled, the inorganic waste gets recycled so that you are reducing on the amounts of inputs and you are reducing the amount of waste that you are generating. If you make these changes, we will make our cities and settlements into sustainable settlements. And quite a lot of things can be recycled.

For example, when we went to Finland, we saw that if there is an industry and the industry is generating waste water, this water is a heated water, and in our country, we will typically dump this water into say a stream or a river, which leads to thermal pollution, because it increases the temperature of water because of which the organisms are unable to survive for quite a lot of stretch in the water body.

Now, what the towns in Finland do is that if there is an industry, say a thermal power plant and it is generating waste water, which is heated water, then this heated water will be put through a thermal exchange device and the heated water will be moved throughout the city. So, in every home, you will find that every room will have a radiator and this heated water coming from the industries it will move through the radiator and then it will go back and so it leaves its heat into the rooms, the rooms get heated, and the cold water that remains is then dumped into the water bodies so that there is no thermal pollution.

So, what we can do to make our cities sustainable is to recycle the waste, convert the waste into a resource, so that the inputs that are required to run the city they are reduced and the waste that is sent out from the city that is also reduced.

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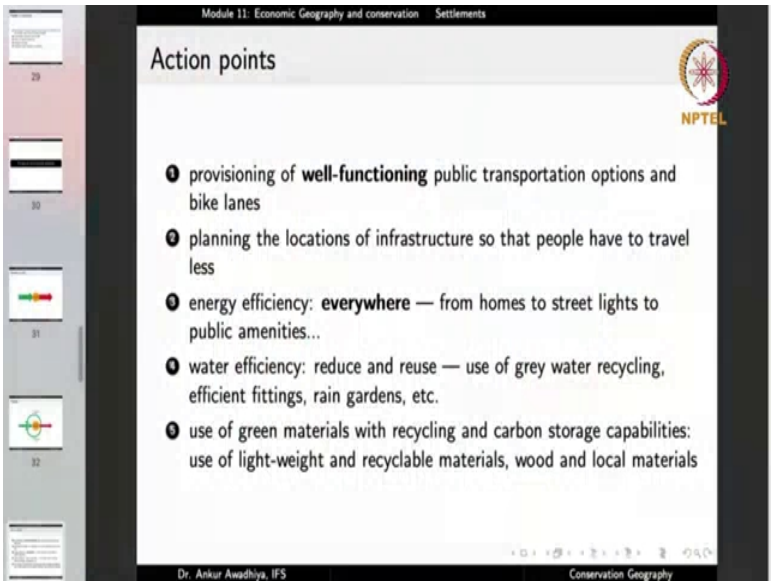

So, what kinds of actions can be done to do that? One, provisioning of well functioning public transportation options and bike lanes; planning the locations of infrastructure so that people have to travel less, so not just use public transport but in a number of cases why use a transport at all. So, for instance, if people have their necessary infrastructure that are close by, if you have markets set up in a way that they are close to the houses, if you have, say, hospitals or schools so setup that they are close to the homes of people, then the amount of transportation or the amount of movement that people have to do that will also go down.

Now, that comes under the discipline of urban planning. So, when we plan a city, we have to ensure that people need to travel less to cut down on the resource use, to cut down on pollution. Go with energy efficiency, everywhere. The homes have to be energy efficient, the streetlights have to be energy efficient, the public amenities have to be energy efficient.

So, not only do you need to incentivize people to shift to more energy efficient appliances, but you also have to ensure that things like government offices also do not have very antiquated equipments that are consuming lots of electricity. You have to ensure that the public amenities or things like railway stations or bus stations, they are energy efficient.

You should, you cannot have a system where you are running AC all day long and you have big windows, there is absolutely no insulation, and so the AC has to run on and on and on, because that will not be a resource efficient usage. So, you have to be energy efficient. In Finland, the houses that we lived in, they were so well insulated, that actually the heater had to run for a very short period of time. The windows had triple layer of glasses just to ensure insulation.

Now, of course, if you go with insulation, if you try to make our buildings more energy efficient, it is going to cost us in the beginning. But then over a short period of time, all these costs are recuperated, because less amount of electricity is needed. So, we have to go with energy efficiency.

Similarly, we have to go with water efficiency, reduce the use of water, reuse water as far as possible, go with grey water recycling, go with black water recycling, use efficient fittings, use rain gardens. Now, we have observed before that a rain garden is very easy to set up. You just need a piece of land, maybe dig a few furrows so that water gets accumulated and plant a few trees.

Just let nature act by itself and the trees will come up by themselves. That is all that is needed. But if you have rain gardens in your cities, then you will cut down on the water requirement in the city, because the rain that is falling on the city that will be conserved, that will move into the groundwater. And so you do not have to bring water from other areas. So, rain gardens have to be there.

You have to cut down on water usage in all the homes. You have to cut down on water usage in all the offices, in public amenities. These days we have faucets that use less amount of water. We have showerheads that use less amount of water. So, these have to be incentivized. Use of green materials with recycling and carbon storage capabilities, use of lightweight and recyclable materials, wood and local materials, if you use these, then we make our cities greener, less resource intensive, because we are making use of those resources that are either renewable or that are actually a storehouse of carbon.

So, in certain cities, we find that people make houses out of wood. Now, if you make houses out of wood, then this wood is going to retain the carbon that was there in the tree for say the next 100 years. But in such cases we have to be extra careful that the woods should only be harvested

in a sustainable manage. To incentivize wood we cannot have a situation where we cut down all our forests and convert all the trees into wood, because that will be extremely inefficient usage of our resources.

But we can always go with a sustainable management of forest, a sustainable harvesting of forest, in which case only the excess trees are cut and these trees are converted into a resource that is able to store this carbon for a very long period of time. So, in place of say going with biomass burning, we convert it into furnitures and especially those furnitures that are so treasured, so well maintained that they retain the carbon in them for say a few centuries that has to be promoted.

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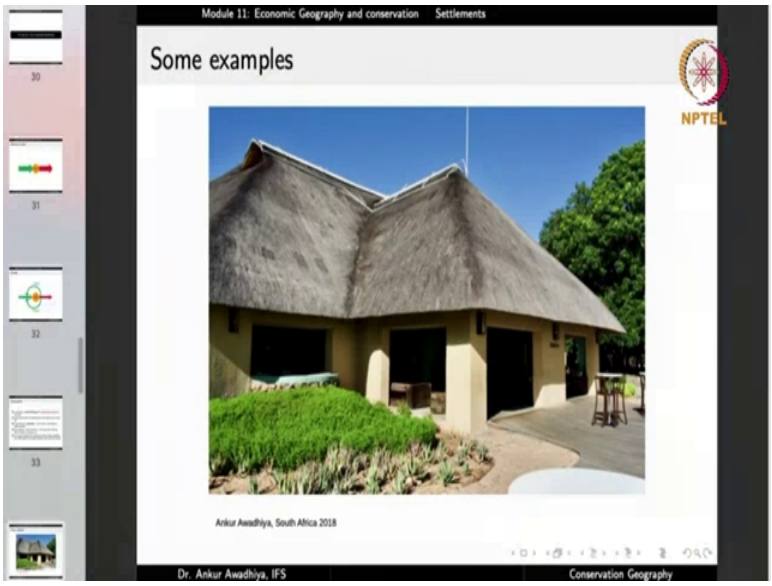

Some examples are the use of local materials. So, in South Africa we find these houses that are inspired by the traditional rondavels which are round houses of the Zulu people who live there. Now, in this case the houses will be oval in shape. They will be made out of local materials. Now, local material is very important, because especially in the case of housing sector when we bring materials from outside from large distances and these materials are heavy materials.

We are talking about things like cement or talking about things like sand or talking about things like gravel. If we bring them from far off areas, then there is a huge transportation cost and there is a huge amount of resource use to move these materials. A much better option is to use local materials that do not have to be transported. So, in this case these houses are made out of local

materials. If you look at their roofs, they have very tall roofs. And these roofs are made out of thatch.

Now, this thatch material is a very good insulator of heat. And so even in the peak summers these houses do not heat up that much, even in peak winters they do not become cold as against our buildings that are made completely out of concrete. So, they have a very good insulation property. And again thatch is available everywhere. So, it is a cheap material. It is locally available. It is a renewable resource. And it stores carbon for a very long period of time. So, several benefits. Now, if you think about such a house it is not that it is a very primitive house.

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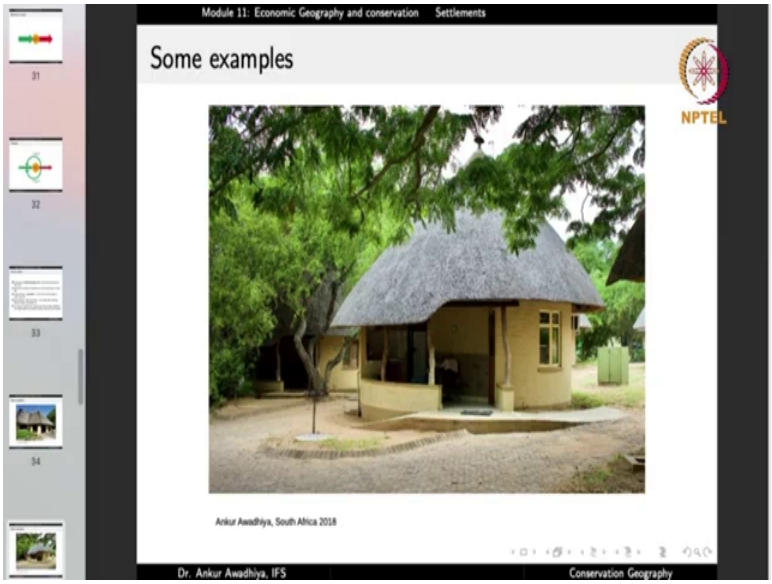

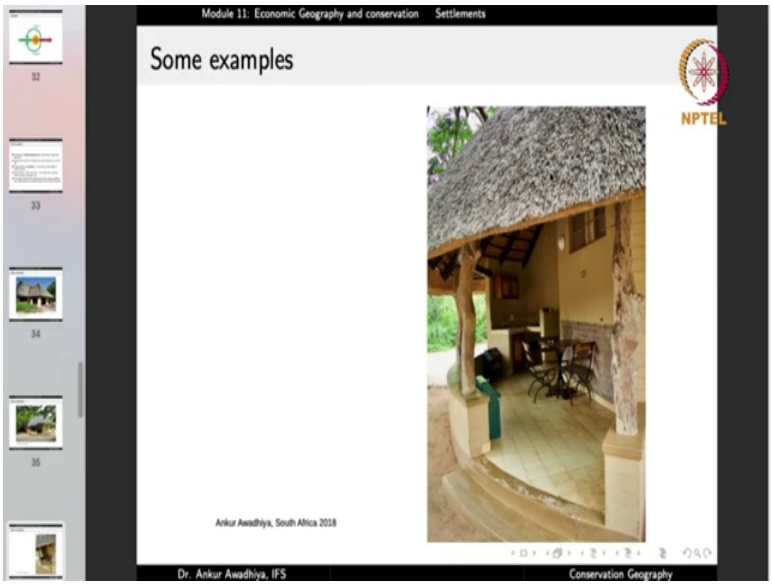

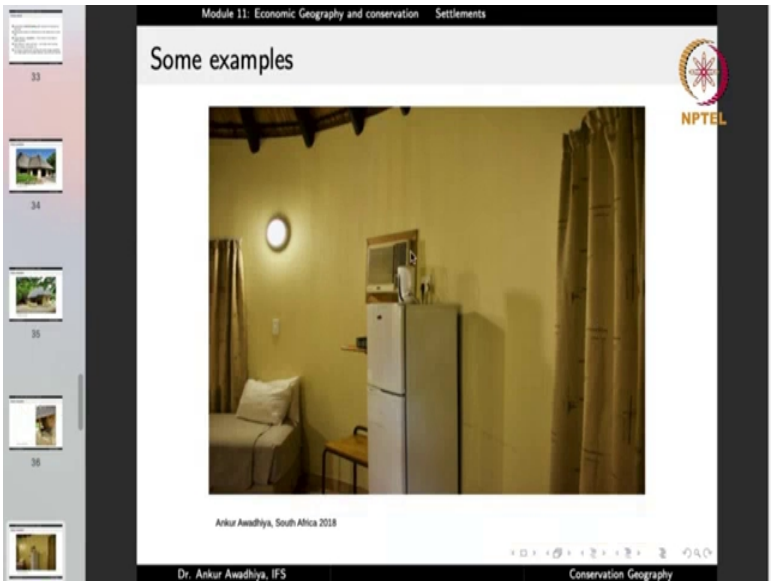
Module 11: Economic Geography and conservation Settlements
Some examples
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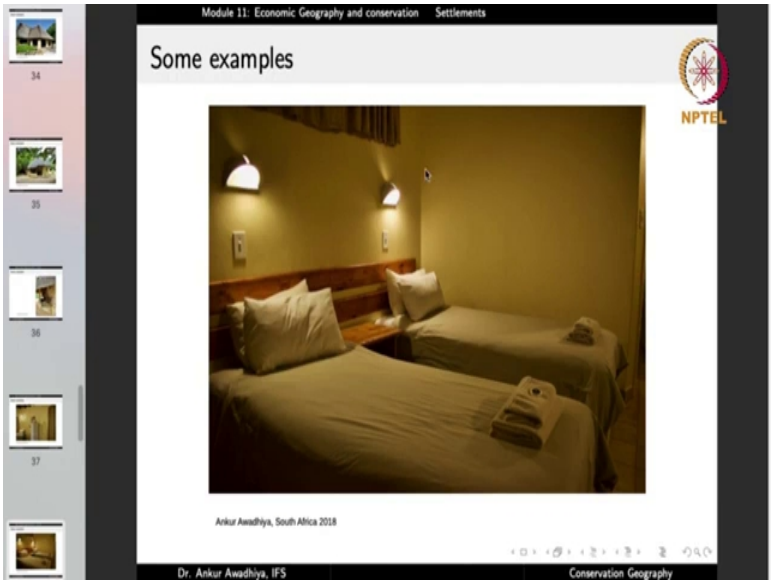
Ankur Awadhiya, South Africa 2018
Dr. Ankur Awadhiya, IFS
Conservation Geography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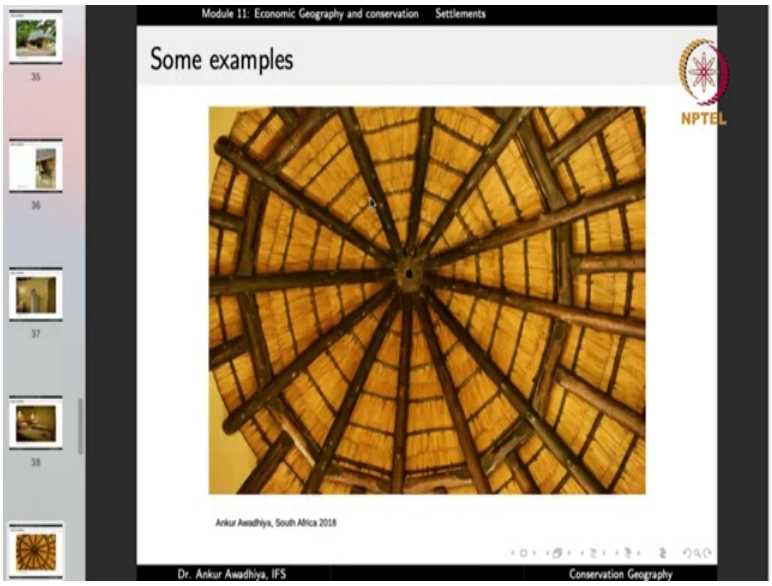

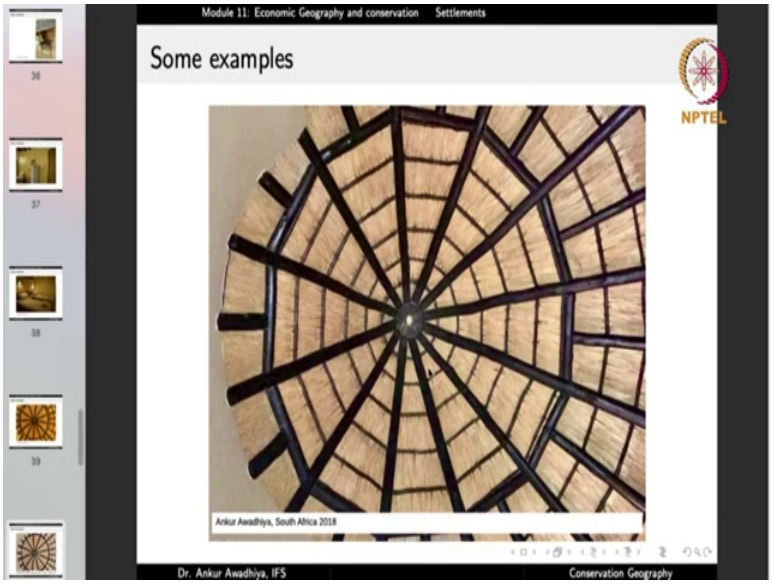

Because like if we look at the house that I was living in, then this house would have an entrance which is a covered entrance and you can very easily set up your table and chair. On the inside, you have even gadgets like air conditioner or fridge, you have these lights which are extremely energy efficient, you have the beds, again you have the lights that are extremely energy efficient, you have very tall roofs. So, these tall roofs ensure that the house remains at an equable temperature.

So, this is an older house, this is a newer house. So, everywhere you will see that this structure is made out of wood and you have all these thatches that ensure that the house does not heat up or become very cold. So, you can have all sorts of modern amenities, but in a house that is climate

controlled. You do not have to spend electricity or lots of electricity for heating and cooling, because the house just does not take the energy from the Sun to heat up and it maintains its temperature even in the colder days.

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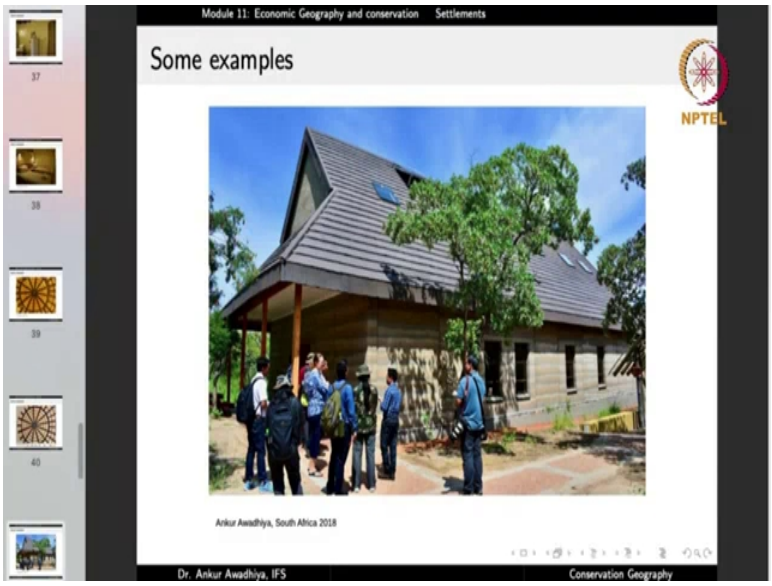

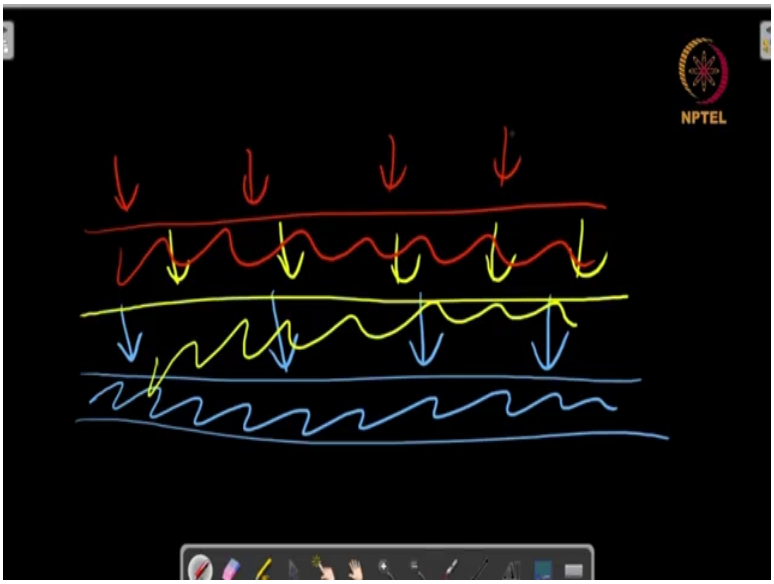

Another example is a rammed earth building. Now, here if you look at the wall, you will find that you have a lot number of parallel layers. Now, a rammed earth building is constructed by putting a layer of soil. So, you have a layer of soil. And this soil is then compressed by applying pressure. Once it has compressed, you put in another layer of soil on top of this, then again apply pressure. You ram it up.

Then once it has compressed, you then apply another layer of soil, then you compress the soil again. By doing this process again and again what is happening is that you have a structure that has this natural design and because this is made out of earth, so it is a very good insulator. Again, this house does not become very hot in summers, it does not become very cooled in winters.

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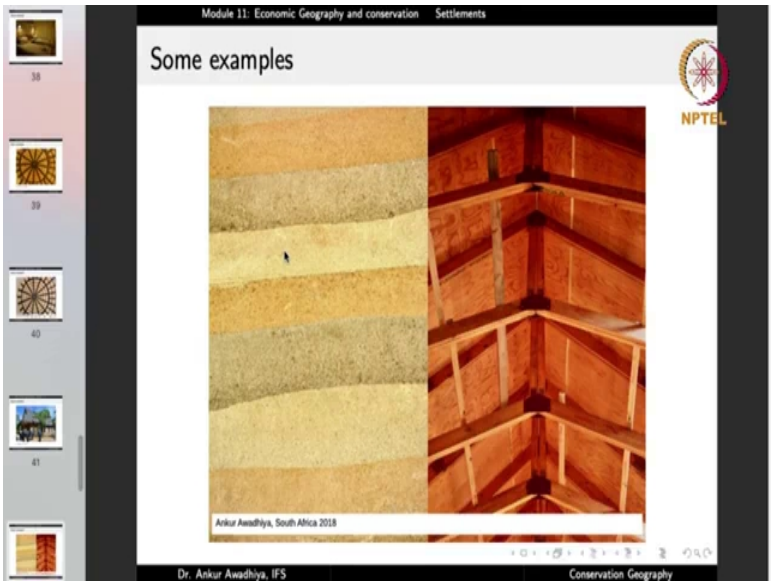

So, this is what the walls will look like. It has a natural design that has come up because the people are using earth or sand to make up this house. The top again is made out of wood, which is a renewable resource and wood again is a very good insulator.

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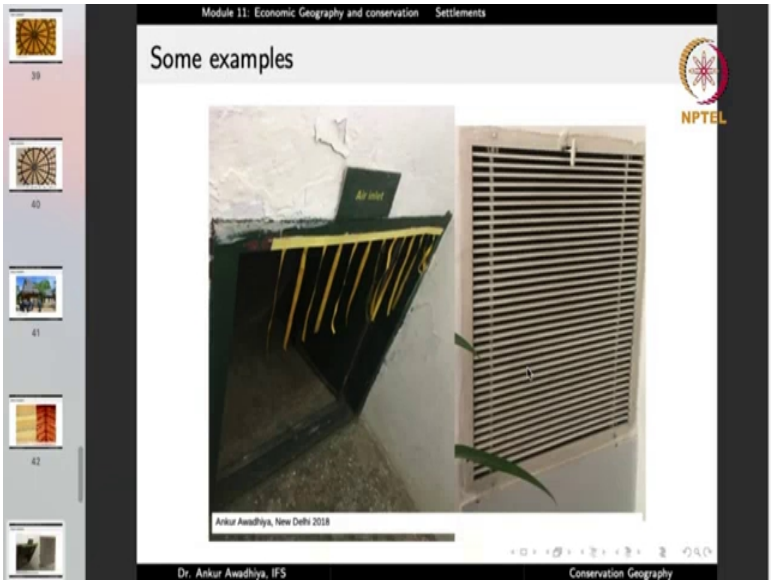

Yet another example is this building in TERI in New Delhi. Now, in this case, there is a system that cools the building using the geothermal resources. So, basically what happens in this case is that you have a building and to cool this building there is a duct that runs below the ground and then it supplies air to this building. So, it is taking air from outside. Let us say that this is the ground level. So, it takes in air from outside and typically this is a bit warmer air.

So, this warmer air gets inside. And below the surface of earth the temperature is more or less held constant in every season. And so with the passage it will slowly become cooler and so not it has cooled down and then this heat is released into this house and the whole house becomes cooler in the summer months.

In the winter months, the opposite thing happens, because here again the temperature below the earth surface is held constant. In the winter months you have a situation where the outside air is very cold and this cold air will enter into this duct and below the surface of soil it will become heated up and then this heated air will be released into the house and the house will be warmed up.

So, the only consumption of electricity is just to run a fan, which will such this air and release it into the house. So, here we have the air inlet and in every room you will have this air outlet. A very efficient way to heat and cool your house.

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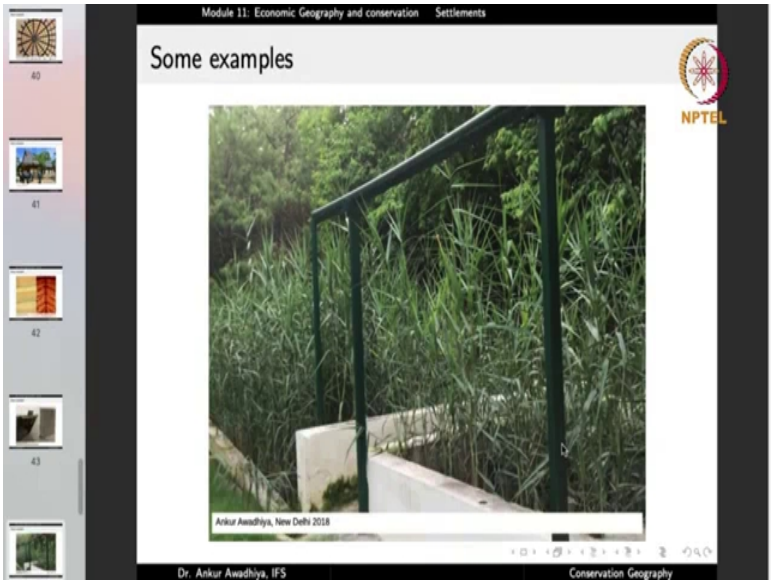

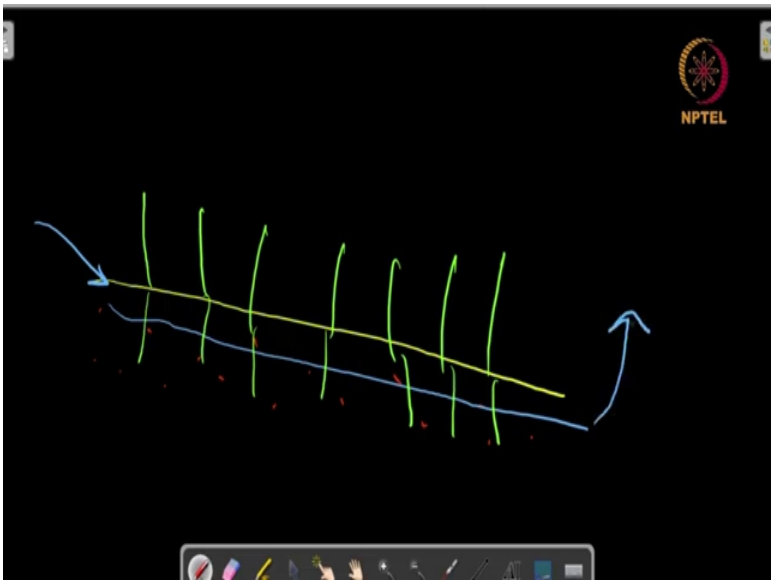

In this building we also have things like the root zone treatment of wastage. So, the sewage that comes out that is treated by passing them through an artificially created area which is somewhat wetland sort of an area. So, in this case what is done is that you have a sloping land on which you have grown a number of plants, typically, these are wetland plants, and the soil is taken such that it is a very porous soil and when you add sewage to this then the sewage is moving through the roots of all of these plants and it gets treated and once it has been treated it is then released and used for things like irrigation.

So, in this case, the biological oxygen demand or the chemical oxygen demand of the sewage is reduced a lot because the roots have a redox zone around them. So, there is oxidation and reduction that is happening near the roots and this is a biological process. So, we do not always need to set up a large scale sewage treatment plant, use electricity to run that plant, maintain that plant, we can do the same thing by using natural plants or trees or sages or grasses.

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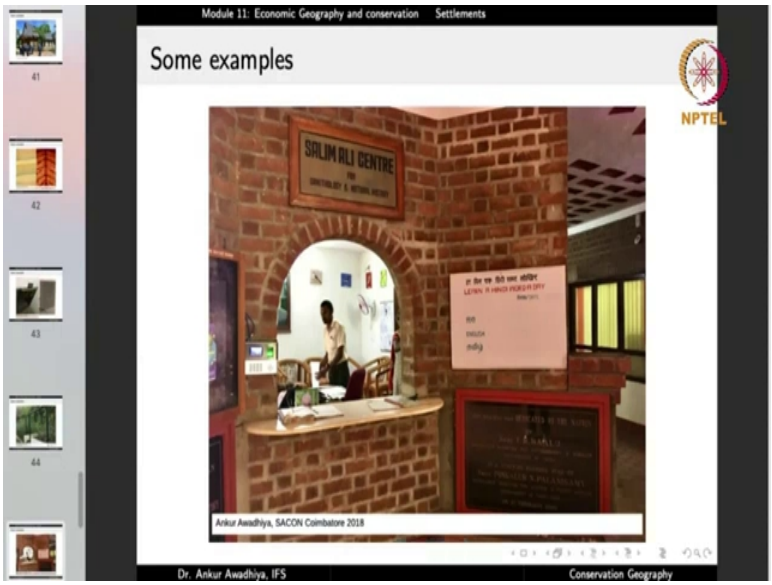

Another example is from the Salim Ali Centre for Ornithology and Natural History. Now, this building is constructed using the Laurie-Baker design. Now, Laurie-Baker was an architect who designed buildings that use local materials and that had a lot of passive heating and passive cooling options. That is basically you do not permit the house to heat up during the summers so that you do not have to cool it.

In the winter you have a house that does not become cold by itself so that you save on the heating expenses. You have so many windows that you are able to capture light from outside so that you do not have to use a tube light or other sources of illumination during the day time. Now, we can just incorporate these design principles into our buildings and make them much more resource efficient.

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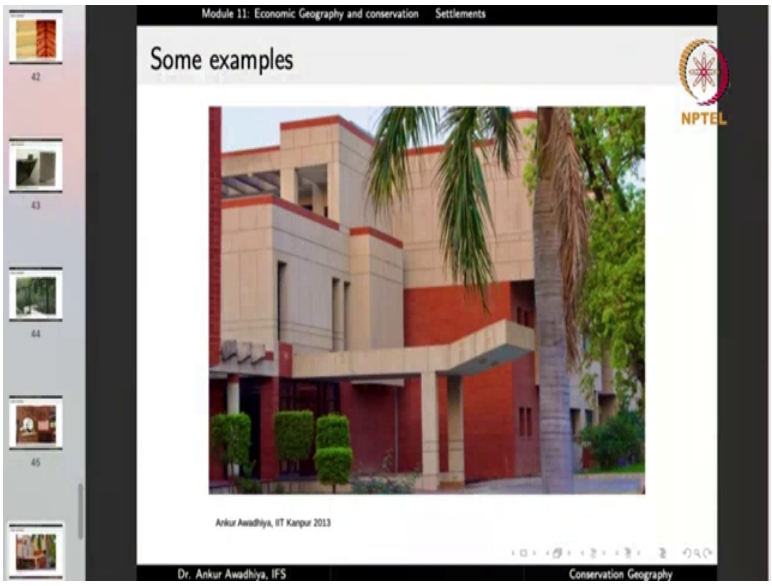

Another example is our buildings at, in the IIT Kanpur campus. So, this is my department building and here again on the roof top we have an arrangement of glazed tiles and these tiles reflect the Sun's heat, so that the building does not warm itself. Here again we have a geothermal cooling system so that the electricity usages reduced. Here again we have large sized windows that capture so much of light that you do not have to use artificial illumination during the day time. And all of this reduces costs.

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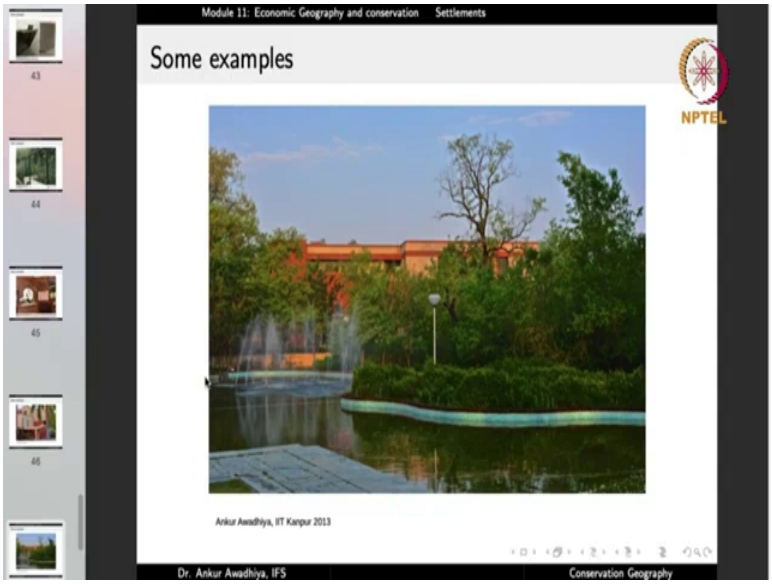

In many buildings we have these water bodies, these artificial fountains that have been constructed to cool the surroundings, to make them more equable so that you cut down on the cooling costs.

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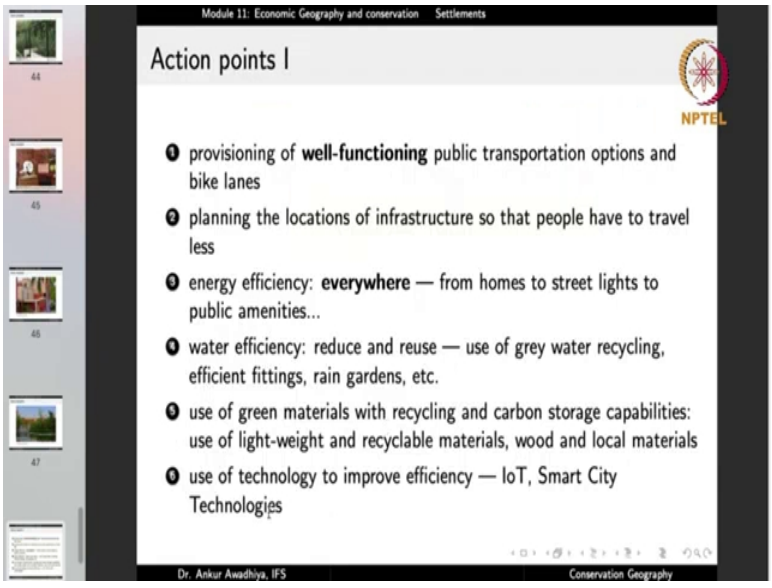

So, we can make use of these green materials or we can make use of technology to improve the efficiency even further. Use things like Internet of Things, use smart city technologies, use sensors for appliances.

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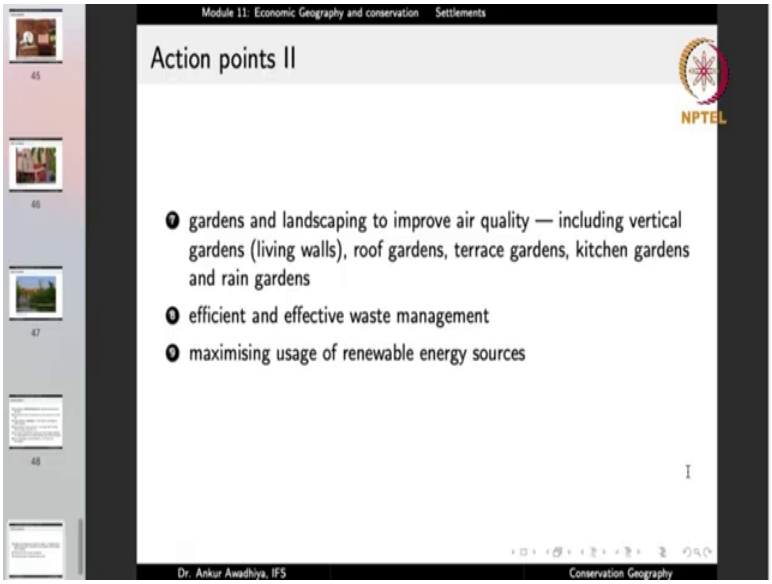

Make use of gardens and landscaping to improve air quality, including vertical gardens, roof gardens, terrace gardens, kitchen gardens, rain gardens. Have an efficient and effective waste management and maximize the usage of renewable energy resources.

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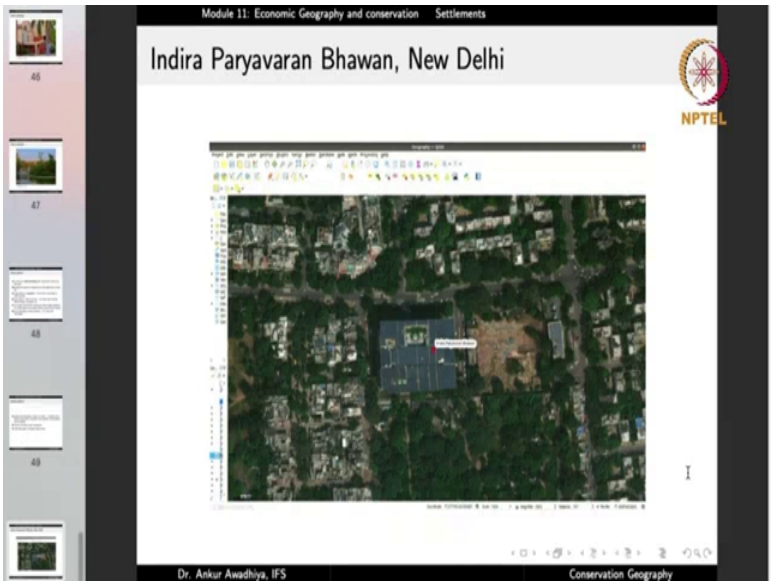

A good example is our ministry building, the Indira Paryavaran Bhawan in Jorbagh in New Delhi. Now, if you look at this building you will find solar panels everywhere. This is the first on-site net-zero building in India, which means that the amount of electricity that the building

generates is equal to the amount of electricity that is consumes. So, there is no net requirement of electricity to run this building.

Now, this is housing a whole ministry. There are so many offices, but still it does not require any more electricity that it is able to generate by itself. And it does so by using highly energy efficient systems, by using lots of insulation and by making use of techniques that are able to bring in the sunlight without bringing in the heat.

Similarly, if you talk about the water usage most of the water gets recycles or most of the water gets reused so that it cuts down on the water usage. Now, we need technologies, we need buildings like to make our cities more and more sustainable.

So, in this lecture we looked at different kind of settlements, the problems of settlements and how we can solve these problems by making our cities more and more sustainable by cutting down on our resource use and by cutting down on the waste that we generate. So, that is all for today. Thank you for your attention. Jai Hind!