Natural Resources Management (NRM)

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Week – 01
Lecture - 01
Introduction to Natural Resource Base: Part 1

Welcome participants to the course, Natural Resource Management.

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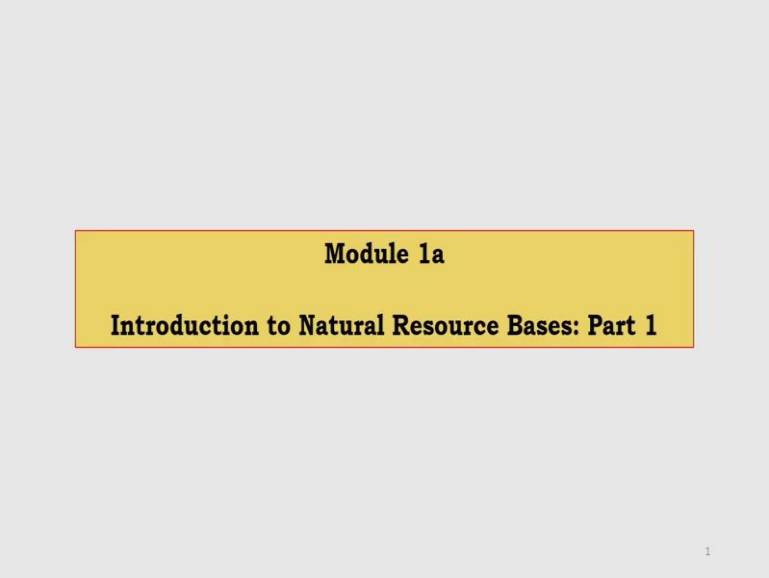

Today, we will be discussing Module 1a as described in the first introductory lecture, when I was talking about the structure of this course. So, today we will be discussing about the natural resource bases.

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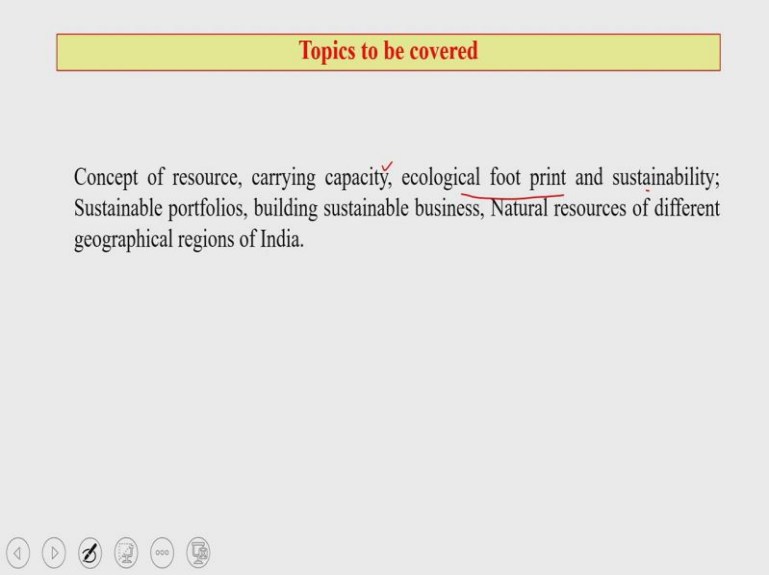

The topics that we will be covering are concept of resource, carrying capacity, ecological footprint, sustainability, sustainable portfolios, building sustainable business, natural resources of different geographical region of our country and elsewhere.

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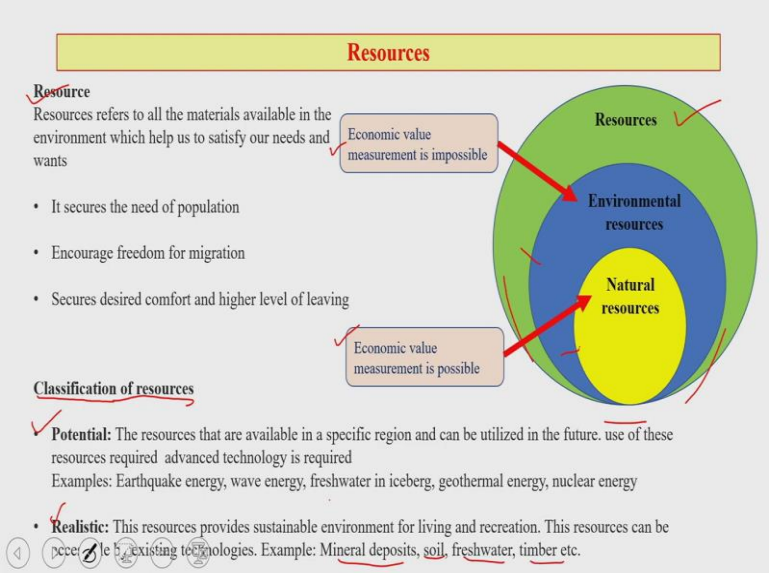

Now, let us look at the basic definition of resource. What do you mean by resource? Resources refers to all the materials available in the environment which help us to satisfy our needs and requirements, it secures the need of population, encourage freedom for migration, secures desired comfort and higher level of living.

Now, if you look at the circle, there are one external circle, the larger domain of overall resources and then inside this large green circle, you have a blue colored circle, which designates environmental resources and those resources, the economic value measurement of environmental resources is almost impossible. Finally, we have this small circle inside we call it natural resources, the economic value of natural resources you can measure.

Now, what are the different classes of natural resources? There are potential resources and also there is realistic resources. What are potential resources? Potential resources are the resources that are available in a specific region and can be utilized in future use of this potential resources are required for advance technology development and its application.

As an example, earthquake energy, wave energy, freshwater in iceberg, geothermal energy and nuclear energy. Next comes are realistic resources. So, these resources, it provides sustainable environment for living and recreation. These resources can also be existing within the different technologies that is available with us. As an example mineral deposits, soil, freshwater, timber etc.

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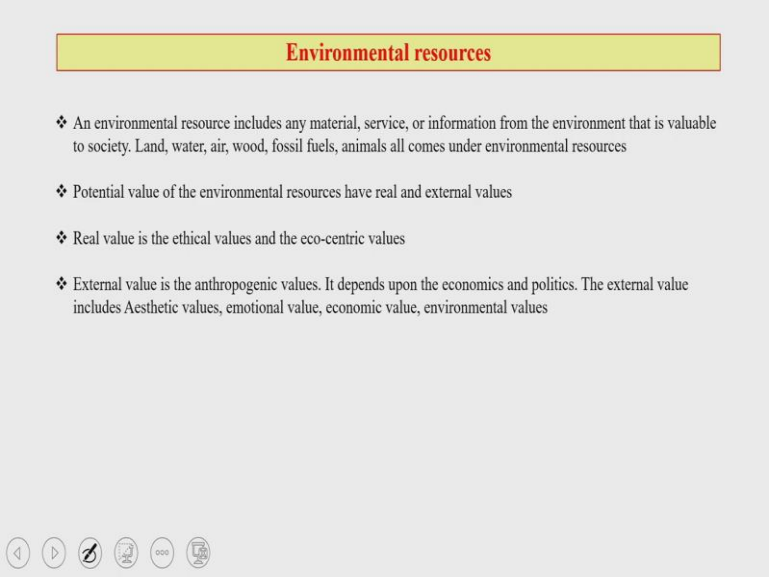

Now, what are the environmental resources? The resources which we cannot measure for economic value. Now, if you look at the different environmental resources, environment resource includes any material, service or information from the environment that is valuable to us, to the society. As an example, land, air, wood, fossil fuel, animals all come under environmental resources.

Now, potential value of the environmental resources have real and external values, real value is the ethical values and the eco-centric values whereas the external value is the anthropogenic values, it depends upon the economics and politics and the external value also includes the aesthetic value, emotional value, economic value and environmental values.

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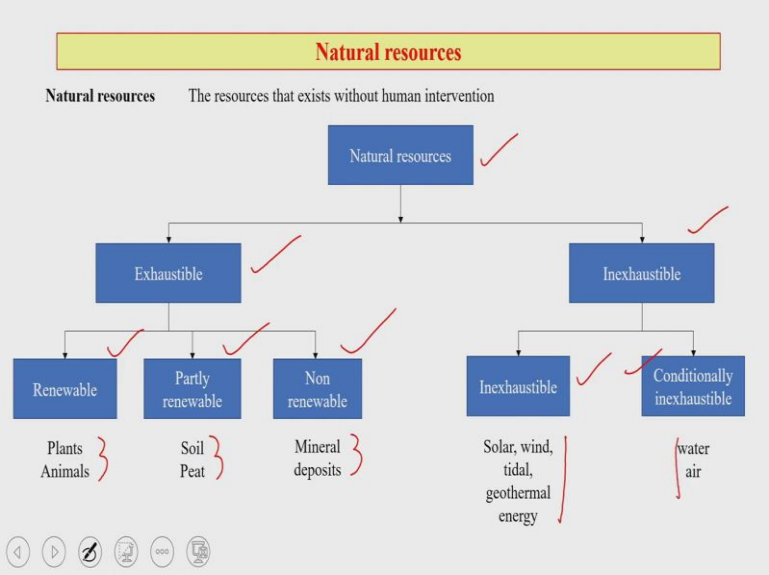

Now, let us look at the different natural resources that exist in our ecosystem. So, natural resources largely it could be of two major type: exhaustible and inexhaustible. Exhaustible again can be divided into renewable, partly renewable, and non-renewable means, which you cannot renew through any process.

Renewable type examples are plants, animals. Partly renewable means which you can to some effort or technology can renew even if they are lost, so soil and peat. Non-renewable are the mineral deposit. So, if you exhaust this resource, you cannot renew through any technology. Now, if we come to inexhaustible resources we have inexhaustible and conditionally ~~is~~ inexhaustible, so two types. Inexhaustible, the examples are like solar, wind, tidal and geothermal energy, whereas, conditionally inexhaustible we have water and air.

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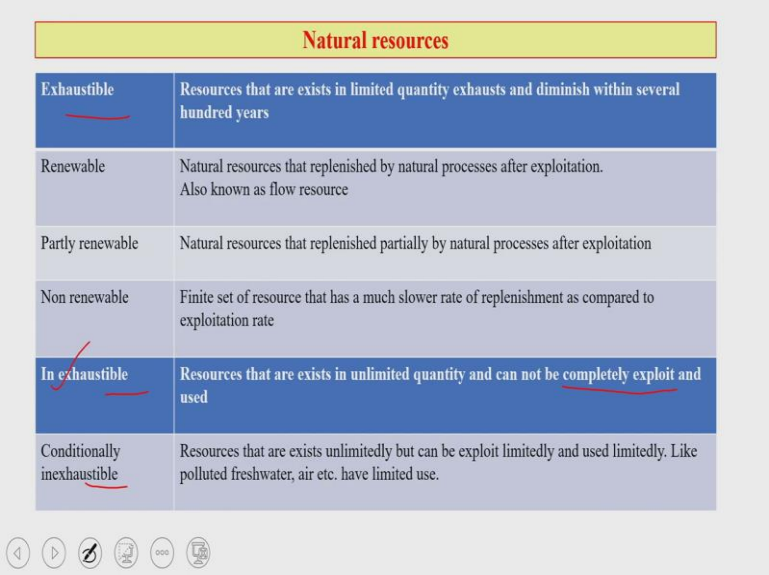

Now, different natural resources, if you look at, these are within exhaustible the resources that exist in limited quantity, and if you use it continuously without proper management practices, they are going to get diminished or finished within a certain period of time. Now, where in case of renewable natural resources that get replenished by natural processes, even after a certain amount of exploitation partly renewable resources are the natural resources that gets replenished partially by natural processes, even after certain amount of exploitation.

Non-renewable resources are those resources which are finite in amount means, if you use them, then getting them replenished is almost impossible. And, next category comes inexhaustible; resources that are existing in unlimited quantity and cannot be completely exploited or used are known as inexhaustible. It means that resources which you cannot use, and somehow remove it from the system as they are in plenty, and these kinds of resources are known as inexhaustible resources.

Conditionally inexhaustible resources that are existing in our ecosystem unlimitedly but can be exploited limitedly and also used limitedly like fresh water when it gets polluted, air when it gets polluted have limited use.

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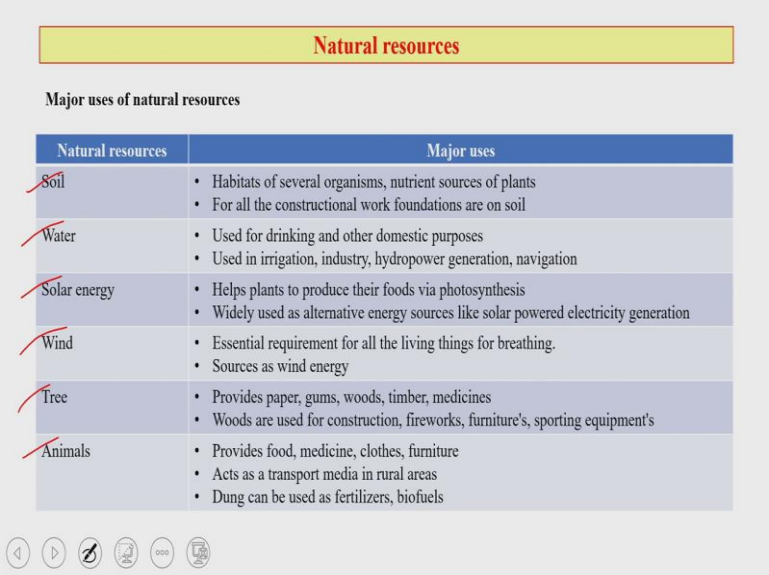

Now, there are few major natural resources which are available in our ecosystem. And I am sure all of you are aware of these important natural resources which are available in our system; soil, water, solar energy, wind, tree, animals, and there are major uses as you see on the right-hand side of this slide.

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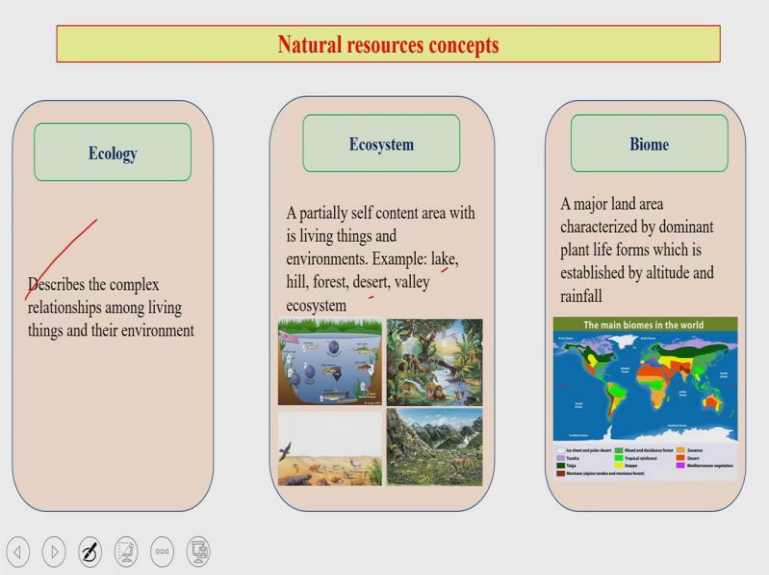

Next, the resource concept; there are different type of concepts which are actually dealing with natural resource management from the ecological angle, ecosystem approach, then biome approach. If you see that each one of them essentially trying to preserve or manage the natural resources in such a way that those resources can be used for the well being of us, for

the society, but they should be also managed in such a way that it can be used by somebody else in the future. So, here lies the concept of sustainability.

So, ecological way of natural resource management, it describes the complex relationships among different living things, their environment, whereas ecosystem we know is an area where living things are interacting with each other, like lakes, forests, desert, in a valley ecosystem, and then we have biome. So, these three concepts are very, very important when we talk about natural resources management.

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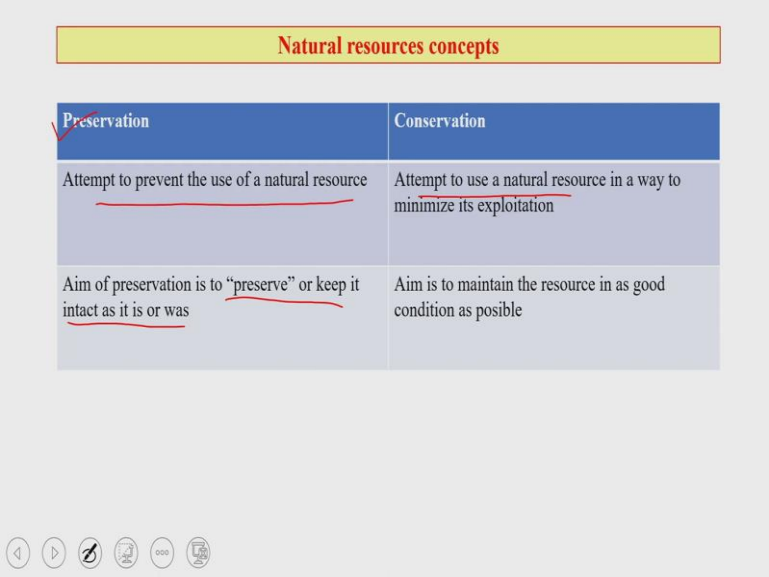

We also need to know two very, very important concepts that is preservation and conservation. Now, often we get confused between these two, whether preservation and conservation are different, or they are the same. So, if you look at preservation, it actually attempts to prevent the use of natural resources. And it also aims to preserve or keep it intact, as it is, or it was. This means it is trying to keep the resource in the same manner as it was available at any point of time.

Whereas conservation is the attempt to use natural resource in a way to minimize its exploitation. And conservation also aims to maintain the resource in as good condition as possible, but both of them has a kind of a philosophy of that means managing the resources in the best possible manner, where in future that particular resource should not be diminished out of our ecosystem.

So, the difference between these two primarily is that in preservation it tries to keep the resource in its natural condition, how actually it was available or it is available, but in case of

conservation, it allow us to use it, but it also encourages to maintain that resource in as good condition as possible.

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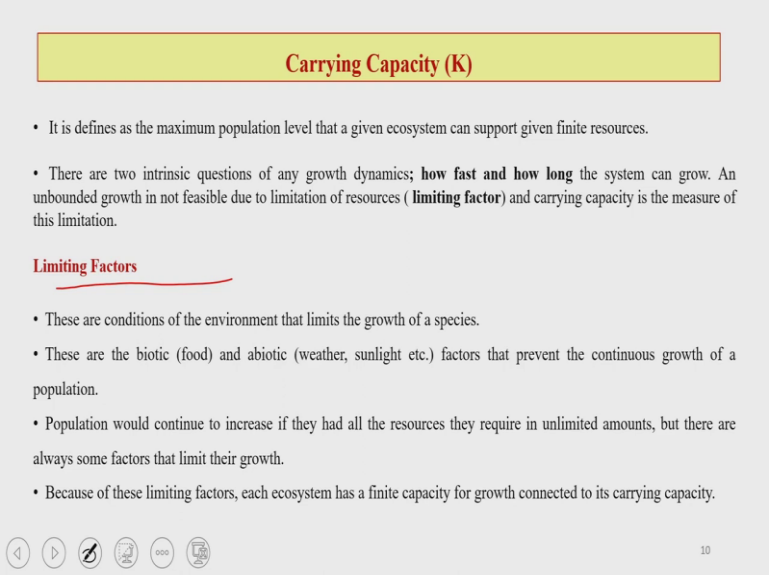

Next, comes the very important concept that is called carrying capacity. So, carrying capacity is very important in case of natural resource management.,

What is carrying capacity? It basically says that to the maximum population level that a given ecosystem which can support with the help of available finite resources. So, that means, whatever resources which nature has provided to us in this ecosystem, with that amount of resources, the maximum population that we can support is known as carrying capacity.

There are two intrinsic questions of any growth dynamics that comes in our mind; how fast and how long the system can actually grow. If you look at in any system, it has a tendency to grow at a very fast rate at the beginning, then after a certain period, it reaches a rate where it stays for some time and then in some cases, it goes down; in some cases, it might go a little up as well, it depends upon various other condition. Now, an unbounded growth is not feasible due to limitation of resources, specially various limiting factors, there are some factors which actually regulate or control this unlimited growth in the system.

Now, what are those limiting factors? Limiting factors as I just said that these are certain conditions of the environment that limits the unlimited growth of a species. These are the biotic and abiotic factors that prevent the continuous growth of a population given all conducive environment for food, water, space and time, you will find that any species will grow in a very faster rate and it will keep on growing, increasing its population at very faster

rate. And that is also very, very risky for sustainable ecosystem because beyond certain limit with the existing resources, natural resources that are available, you may not able to support that number of population.

So, population would continue to increase if they had all the resources, which they require, and that too in unlimited amounts. So, you need certain limiting factors in the system to regulate their growth, because of these limiting factors, each ecosystem has a finite capacity of growth and that we call carrying capacity of a system.

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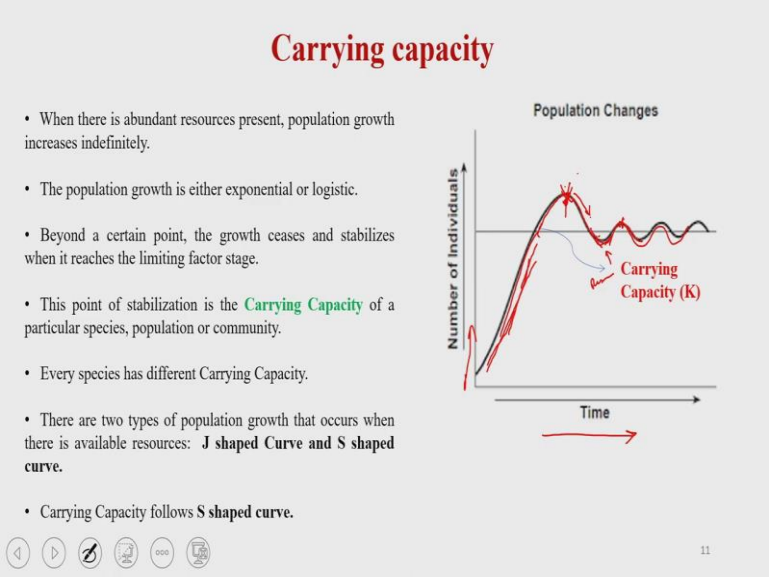

So, if you look at this graph, on the y axis, you have number of individual and in the x axis you have time. Now, this is the population change, when food, energy everything is available in very, very in a good amount. So, populations keep on growing, it grows and then at certain point of time, when it reaches peak, then the supply of food energy will be less, then the population starts dipping down, it comes down and then again, when you reach is a lowest population, then there is again availability of resources. So, it goes up. So, this continues and these particular phenomena is very unique in the system.

When there is abundant resources present, population growth will increase indefinitely. As I mentioned, population growth is either exponential or logistic in nature, so beyond a certain point, this is the point peak, maximum peak, the growth ceases and either it will stabilizes or if there is presence of limiting factor, you will see that it will try to come down and it goes below the saturation level and then there is again availability of resources in the system.

So, once again the resources becomes available, they grow in number and tries to reach a peak. So, again they come towards the peak, then there is lack of resources. So, they again population goes down. So, these phenomena continues and this is called kind of a regulation by certain limiting factors and those factors as I said are food, energy, time. There are two types of population growth that occurs when there is available resources, one is J shaped curve and the other is S shaped curve. Carrying capacity follows a S shaped curve, the curve that you see here.

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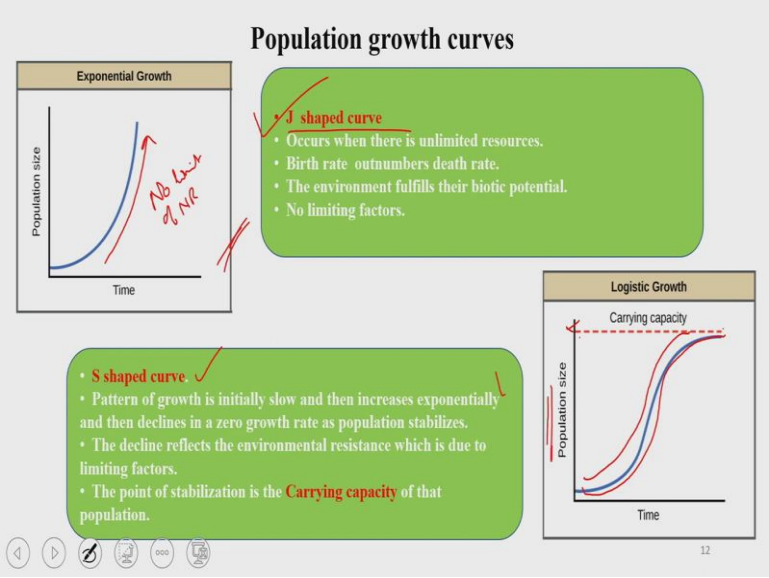

So, if you look at the two different population growth curves as mentioned in the slide, the J shaped curve, it occurs when there is unlimited resources. So, there is no limit of natural resources. So, population start growing exponentially. Birth rate outnumbers the death rate means number of people were born is much higher than the number of people dying.

So, naturally the population will grow like anything, the environment also fulfils their biotic potential. And most importantly, as I said, there is no limiting factors. So, in that kind of situation, the population growth curve that you get is J shaped and it is growing like exponential manner.

Whereas, the other curve which is S shaped curve, here the pattern of growth is initially slow and then it increases exponentially and then declines in a zero-growth rate as population stabilizes, as you see that it goes and then it stabilizes here means, the optimum amount of resources when available. Beyond that, if they try to grow then there will be a lack of supply for required resources.

So, pattern of growth in this case is initially slow and then it increases and then declines. The decline reflects the environmental resistance which is due to the limiting factors as I explained in previous slide. So, the point of stabilization, that dotted line as you see here, that is the point of stabilization means population growth is taking place and then when it reaches this point, it tends to stabilize. That point of stabilization is known as carrying capacity of that particular population.

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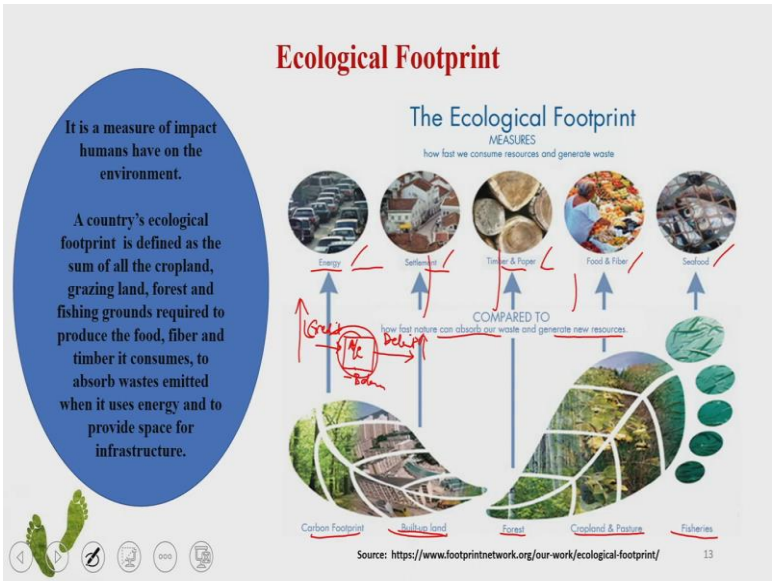

Next, ecological footprint, another very, very important concept and which is very important, when we talk about natural resources management aspect. Now, ecological footprint, it basically is a measure of impact of human on the environment and any country, its ecological footprint is defined as the sum of all the cropland, grazing land, forest, fishing grounds, which are required to produce the food, fiber and timber for its population and then that population when it generates wastes, so, that also can be absorbed by this system, when it has to absorb that waste, it uses certain amount of energy and to provide space for the infrastructure that is required for this population.

That means if your population is higher or increasing, so that means it will require more of resources and it also will generate more of wastes and to sustain that increasing population you will need higher amount of energy you will need much more infrastructure, space, so that means with the increasing population, your footprint also increases.

Now, if you look at that, how actually the ecological footprint affect our system; largely through various demands, like energy demands, space demands, timber, food, fiber, seafood and many things which are required for our survival and to fulfil our demand.

Now, when we take all those things from the nature then also we need to replenish it in the system, if you continue, try taking it from the system, certainly, the ecosystem will have nothing in it to provide in future. So, how faster nature can absorb the waste and generate new resources is key for the sustainability of our ecosystem.

Now, as you see that in most of the cases with increasing population; demand for energy, food space, everything goes up. So, certainly your carbon footprint also increases, your built of land also increases, forest you start utilizing the natural resources from forest more than, earlier, cropland and pastures areas need to be increased.

Of course, the fisheries resources are also consume higher. So, that means, everything is increasing; the debit part, if you look at this as a bank account, suppose you have a account and there is from some sources that money is coming into it, which you call as credit and if you take out we call it as debit.

So, if your debit becomes higher than your credit, then certainly your bank account will be having negative balance. So, the same way if from the ecosystem, if we start taking everything more than its replenishment, then the ecosystem also will have a negative balance and which is unsustainable for the ecosystem. So, we should try to minimize our ecological footprint by adjusting our lifestyle by adjusting our demand for different natural resources, which is the beginning of, the sustainability concept or thinking.

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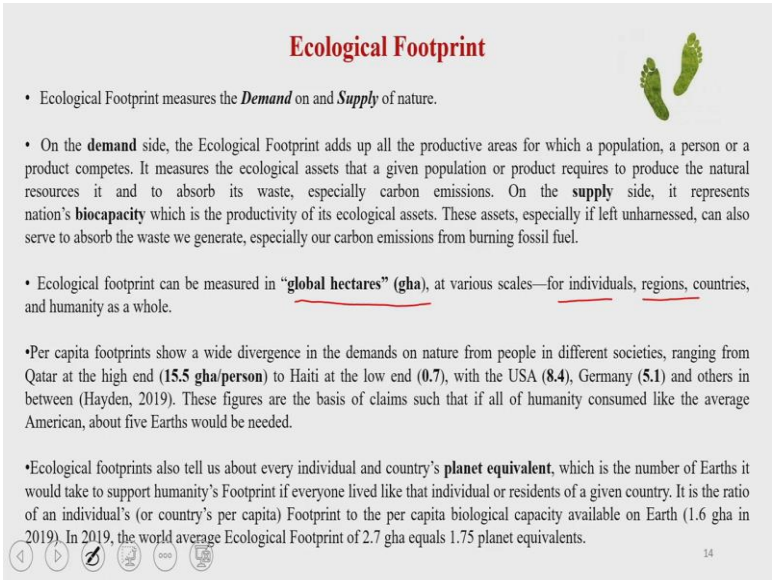

Ecological footprint in many way actually, it measures the demand and supply just now that that I have explained to you and if you will see that ecological footprint we can measure in different manner, we can measure in global hectares scale and various other scale for individuals for regions for countries.

So, there are various ways that people actually measure ecological footprint of an individual or of a country. So, this is a kind of a measuring system, that how actually mankind is creating the amount of pressure on the natural resource base or environment or our ecosystem. So, we must continue checking it time to time and see where we are actually placed at the moment.

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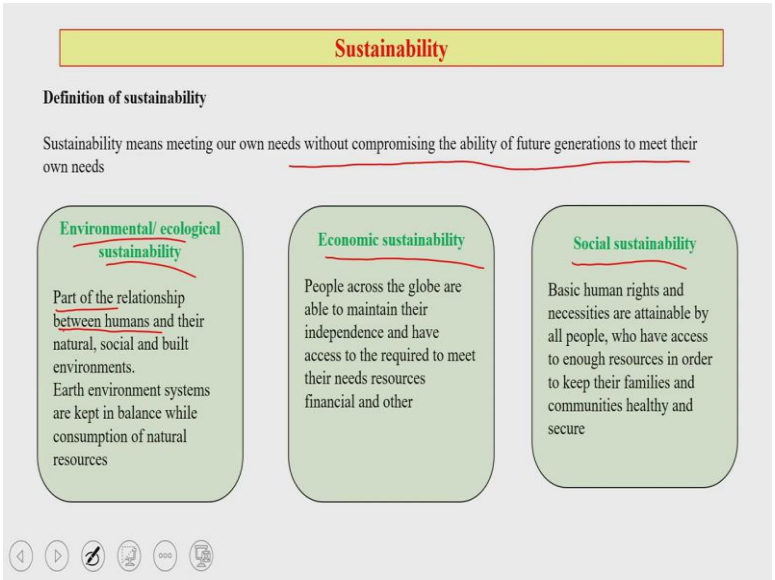

So, as I said, that from this point, the concept of sustainability comes in. And when we talk about sustainability, we basically means that we should meet our need, but without compromising the ability of future generations to meet their own needs. So, there are different types of sustainability concepts that you will find environmental or ecological sustainability is one, economic sustainability and of course, social sustainability.

So, when we talk about the entire system, we need to talk about not only environment, but also economy and also society. So, the environment and ecological sustainability as you see that it is basically a relationships between human beings and their natural, social and built environment. When we talk about economic sustainability, it is largely people across the globe which are unable or able to maintain their independence and have also access to the required resources to meet their need.

So, what is social sustainability? Social sustainability is again the basic human right that we talk here and the necessities or the requirements which are attainable by all people. So, here you find a sense of inclusivity in social sustainability concept. Here also it says that all people who have access to enough resources in order to keep their families and communities healthy and secure. So, these three concepts if you look at, they are very, very clear.

One is talking about natural resources, environment, ecology, how best you can utilize the resources without harming the ecosystem, the economic sustainability talks about that, how actually people will be able to maintain their independence, their well being using different resources. So, the third one social sustainability, it talks about that, how all the people will be able to get the benefit through utilizing the resources that are available, and it should be accessible to all to keep their family community healthy and safe or secure.

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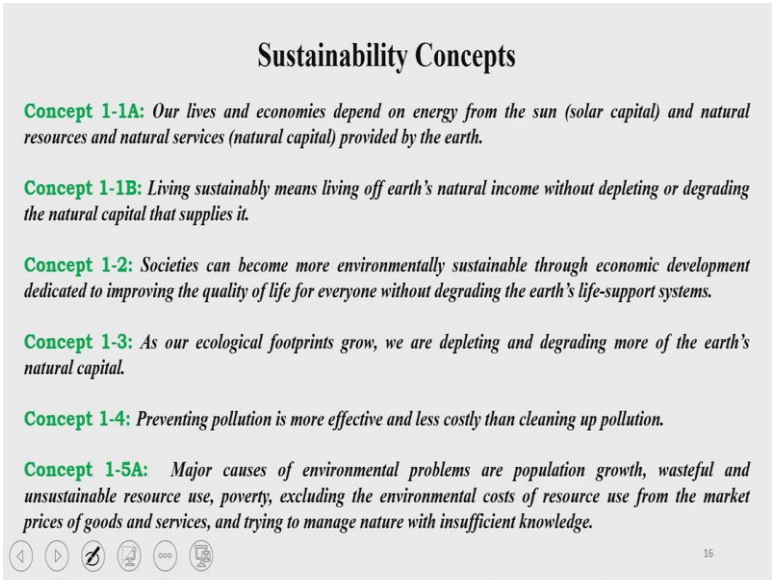

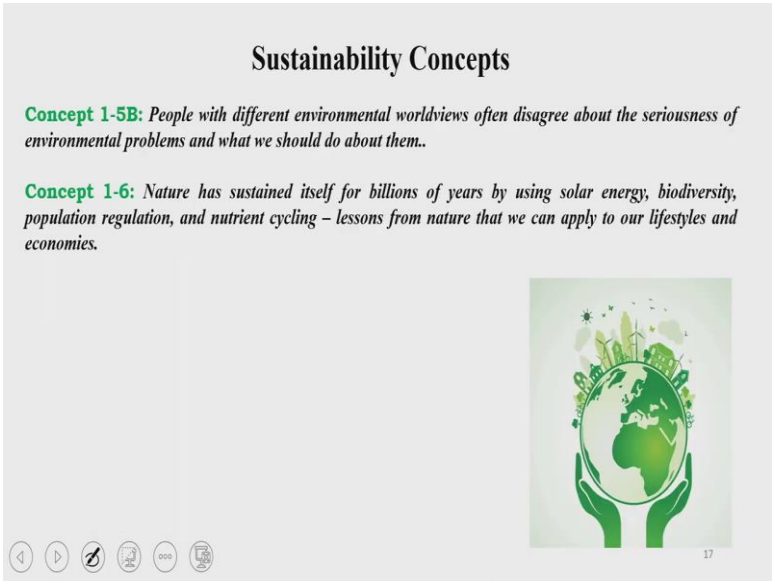

So, there are various sustainability concepts, you will see that. So, this I will be sharing some information in coming classes. And also, we will be discussing in further detail, different concepts, they talk about different aspects of our ecosystem sources, and how that should be dealt with.

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So, sustainable development is a very important topic of today, you have now presently sustainable development goals or SDGs, which almost in every forum and every discussion, you will find that people are trying to link it up with any activity that we are doing, how they are going to actually address one of these seventeen sustainable development goals as it is mentioned in these slides.

So, the objective is to see the system in such a way that we should be able to somehow address one or few of these sustainable development goals so that in future we can achieve them and make these, beautiful or as a safe place to stay and also prosper.

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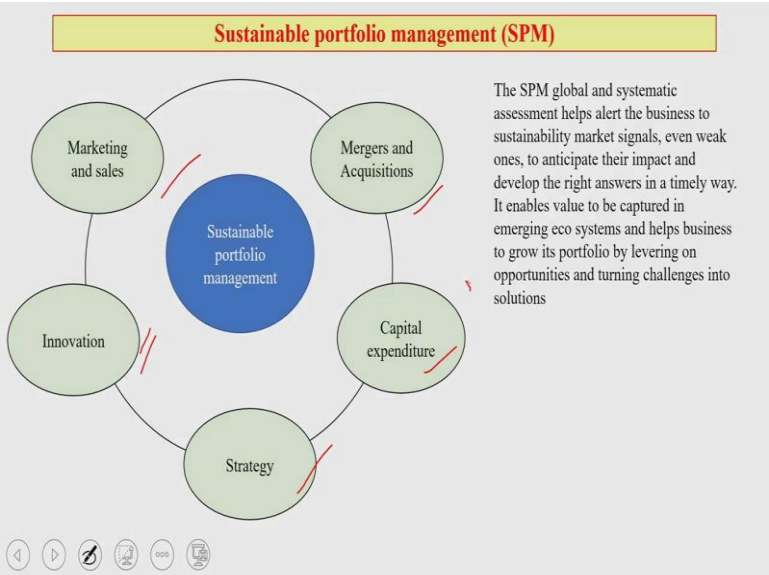

So, friends, if you look at the sustainable portfolio management, then you will find that sustainable portfolio management basically consists of marketing and sales, mergers and acquisitions, capital expenditure strategy and innovation. So, this together make the Sustainable Portfolio Management system, what we call as SPM.

So, SPM is a global, and it is a systematic assessment, which helps us to do business with a sustainable mindset, even the poorest of the poor countries, they should be able to anticipate their impact and they should be also able to develop in a timely manner. So that is important. So, sustainable portfolio management, it enables also to value the system the value the resources to be captured within this ecosystem.

SPM also helps the business to grow its portfolio by leveraging on opportunities and turning challenges into solutions. So, how do you actually do that? A critical aspect of SPM is innovation. So, Innovation is key for sustainable portfolio management with true innovation, you actually basically generate new products, new technologies, and then you go for marketing and sales, you can go for mergers or acquisitions of technology, which are sustainable in nature, then you go for capital expenditure, and to do all those things, you need a very smart strategy.

So, today, even in the field of business management, sustainable portfolio management has become a critical part of resource management. And when we talk about resource management, again, I would like to mention that the key is that you utilize the existing and available resources to the best of its potential with a significant amount of that resources should be kept for also future uses. And for that, you need a smart management system of resources.

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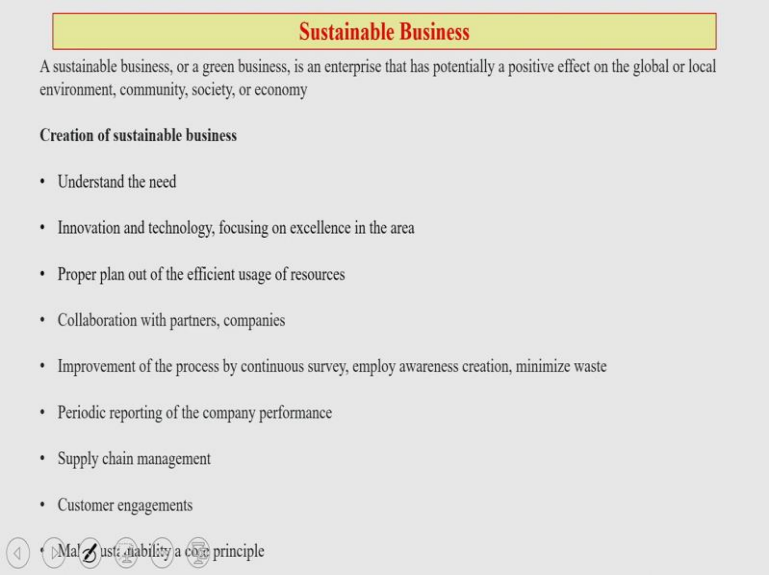

Now, if we look at sustainable businesses, you will see that a sustainable business or some people call it as green business is an enterprise that has potentially a positive effect on the global or local environment, community or economy. Now, creation of sustainable business is a challenge because you have to grow in such a manner that again, your supporting resource base should not be diminished.

So, you need to understand the exact need of your population and then you go for innovation technology development, you should actually come out with proper plan out of, different efficient use of the resources around you collaborate with your partners, your friends, your colleagues or different other companies, improvement of the processes that you are following should be always surveyed, monitored, evaluated, and then you go for awareness creation, minimization of wastes, periodic reporting of the company performance supply chain management, customer engagement, these are all are very, very important aspect of sustainable business portfolio management.

Which if you see that, that you can do a business, you can go for entrepreneurship, utilizing the resources available with you at the same time with a proper management system in place, which helps you to grow with, in a sustainable manner, so, that your future generation can also continue getting the benefit of the resources that are available in this ecosystem. So, friend, we stop here and we will continue in Module 1a in next class. Thank you very much.