United Nations Sustainable Development Goals (UN SDGs)
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Lecture 5
Thinking Alternatives and Innovation

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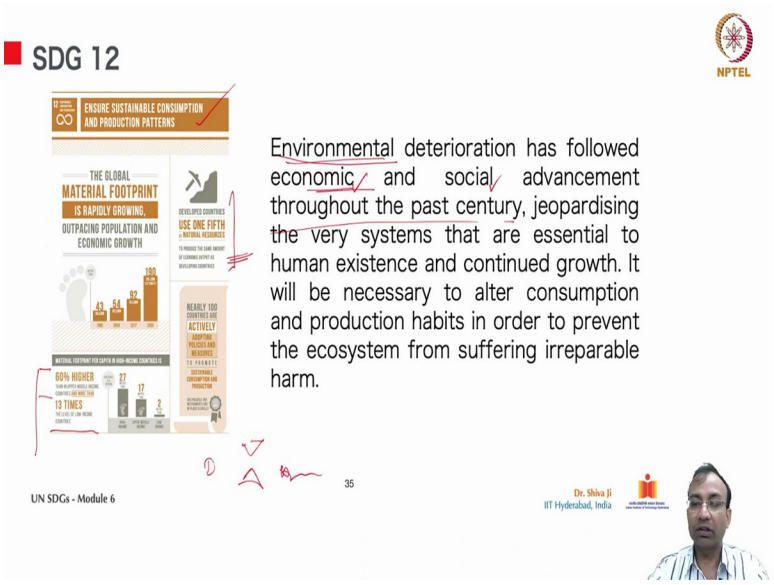

So with respect to SDG 12, the global material footprint is rapidly growing. Outpacing population and economic growth. Developed countries use 1 fifth of natural resources to produce same amount of economic output as developing countries.

That means, there are many developing countries, a few developed countries. So there is a gap between the investment and production in both the countries, developed and developing. So there is a disparity.

Material footprint per capita in high-income countries is 60 percent higher than in upper-middle income countries and more than 13 times the level of low-income countries. So see the disparity. Nearly 100 countries are actively adopting policies and measures to promote sustainable consumption and production.

So environmental deterioration has followed economic and social advancement. So at the cost of environment, well this has primarily grown, somewhat this has also grown throughout the past century, jeopardizing the very systems that are essential to human existence and continued growth. It will be necessary to alter consumption and production habits in order to prevent the ecosystem from suffering irreparable harm.

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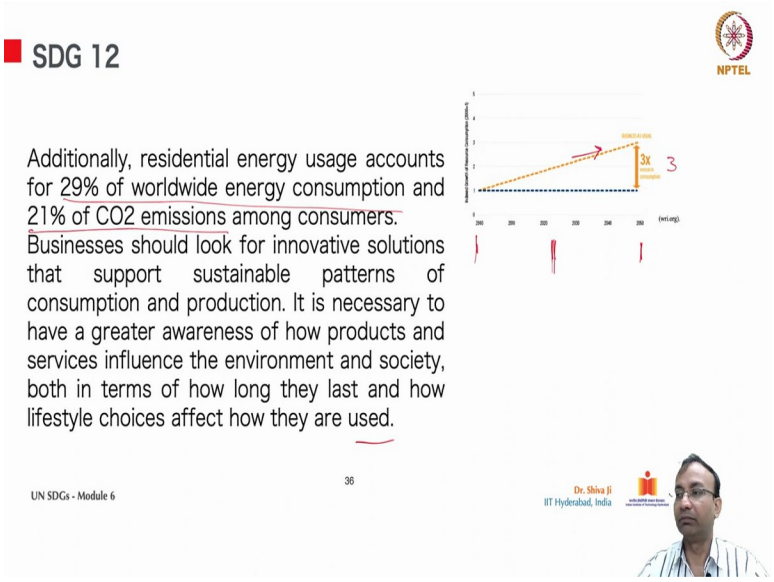

Additionally, residential energy uses accounts for 29 percent of worldwide energy consumption and 21 percent of CO2 emissions among consumers. Businesses should look for innovative solutions that support sustainable pattern of consumption and production.

It is necessary to have a greater awareness of how products and services influence the environmental, environment, and society both in terms of how long they last and how lifestyle choices affect how they are used.

You can see it here. From year 2000 to 2050 it is projected, we are somewhere around in this stage. So resource consumption is going to get like triple, if it is business as usual. If the way it is progressing without sustainable development like practices is going to triple that is the projection.

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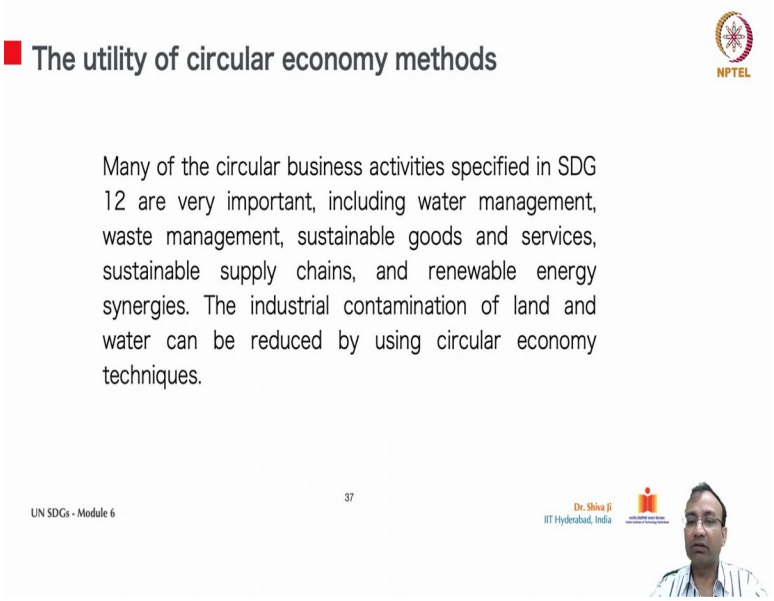

Many of the circular business activities specified in SDG 12 are very important including water management, waste management, sustainable goods and services, sustainable supply chains and renewable energy and synergies. The industrial contamination of land and water can be reduced by using circular economy techniques.

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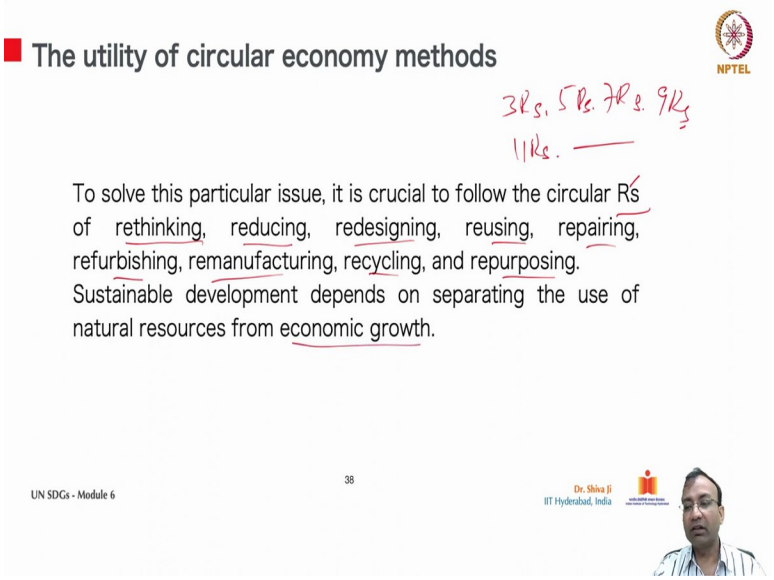

To solve this particular issue, it is crucial to follow the circular like rethinking like Rs. There are several Rs you may knowing like 3 Rs and there are 5 Rs, 7 Rs, 9 Rs and even 11 Rs, and even more than that.

So those Rs actually if you will see, they help in multiple stages. The first one comes from like rethinking or reviewing when we make our decisions and that, after that reducing,

redesigning, reusing, repairing, refurbishing, remanufacturing and recycling, repurposing, etcetera, etcetera. Sustainable development depends on separating the use of natural resources from economic growth.

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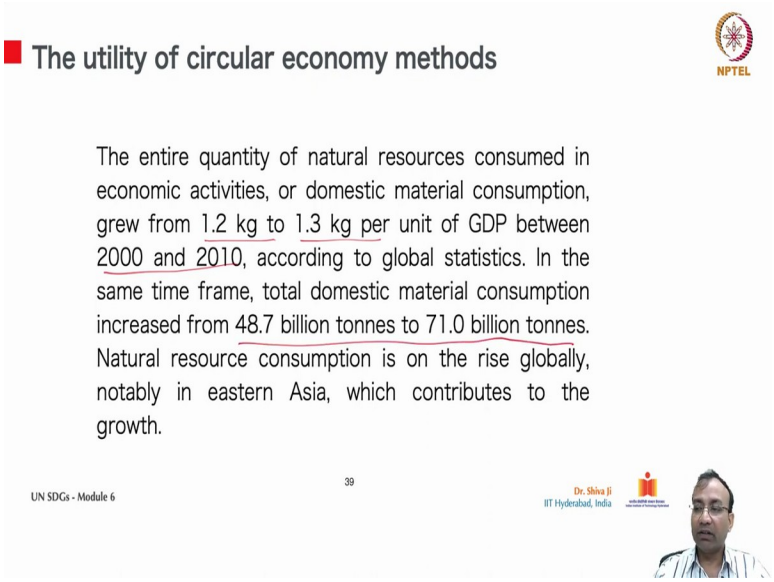

The entire quantity of natural resources consumed in economic activities, or domestic material consumption grew from 1.2 kg to 1.3 kg per unit of GDP between the year 2000 and 2010. According to global statistics in the same timeframe total domestic material consumption increase from 48.7 billion tonnes to 78, 71 billion tonnes. Natural resource consumption is on the rise globally, notably in eastern Asia, which contributes to the growth.

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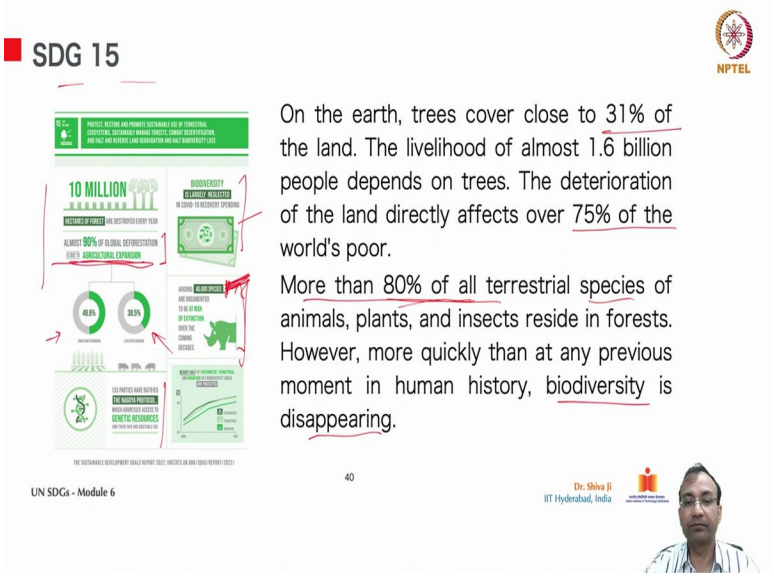

Coming down to SDG 15. So we have 10 million hectares of forests are destroyed every year. Almost 90 percent of global deforestation is due to agricultural expansion. Well, agricultural lands are needed but they are happening at the cost of like you are taking away the forests, and even residential industrial growth and expansions of the cities and towns and villages is also happening at the cost of a loss of the forests.

So livestock grazing cropland expansion, if you see 49.6 percent. Livestock grazing 38.5 percent, and then 133 parties have ratified the Nagoya protocol which addresses access to genetic resources and their fair and equitable use.

Biodiversity is live largely neglected in COVID-19 recovery spending. Around 40,000 species are documented to be at risk of extinction. 40,000 species. Not 1, 2 or 10 or 100. 40,000 to be at risk of extinction over the coming decades. So and there may be even more but at least this much are documented and on the record that these many species are on the brink of extinction.

On the earth, trees cover close to 31 percent of the land. The livelihood of almost 1.6 billion people depends on trees. The deterioration of land directly affects over 75 percent of the world's poor.

More than 80 percent of all terrestrial species of animals, plants, and insects reside in forests. So you can just imagine the loss of habitat which will happen for the majority of the species, 80 percent of all terrestrial species.

However, more quickly than at any previous moment in human history, biodiversity is disappearing. This is the most hazardous, most actually crucial kind of like a change.

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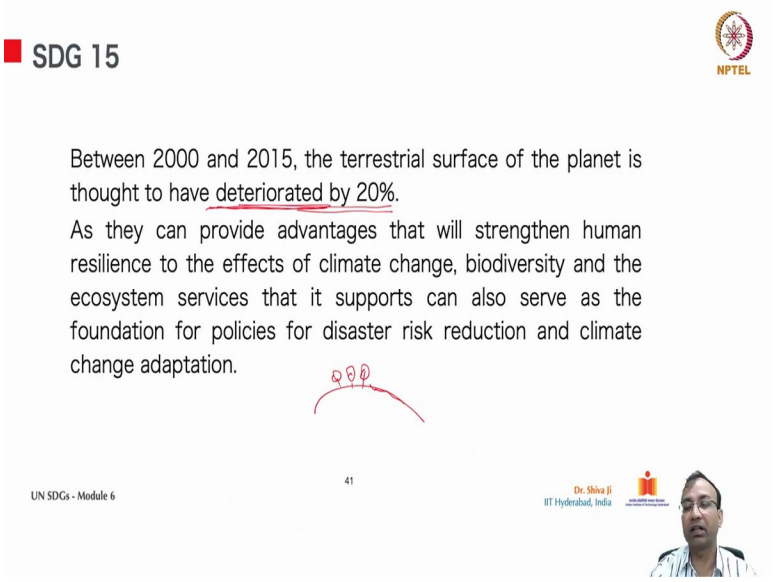

Between 2000 and 2015, the terrestrial surface of the planet is thought to have deteriorated by 20 percent. So again, there is another cause like deterioration of like the terrestrial surface, this land surface what we have. So that is getting like deteriorated degraded.

As they can provide advantages that will strengthen human resilience to the effects of climate change, biodiversity and the ecosystem services that it supports can also serve as the foundation for policies for disaster risk reduction and climate change adaptation.

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Habitat loss for all species, a decline in freshwater quality, an uptick in soil region, land degradation, and increased carbon dioxide emissions are all consequences of deforestation

and forest degradation. In other words, ignoring trees has an impact on the health of the world and our communities.

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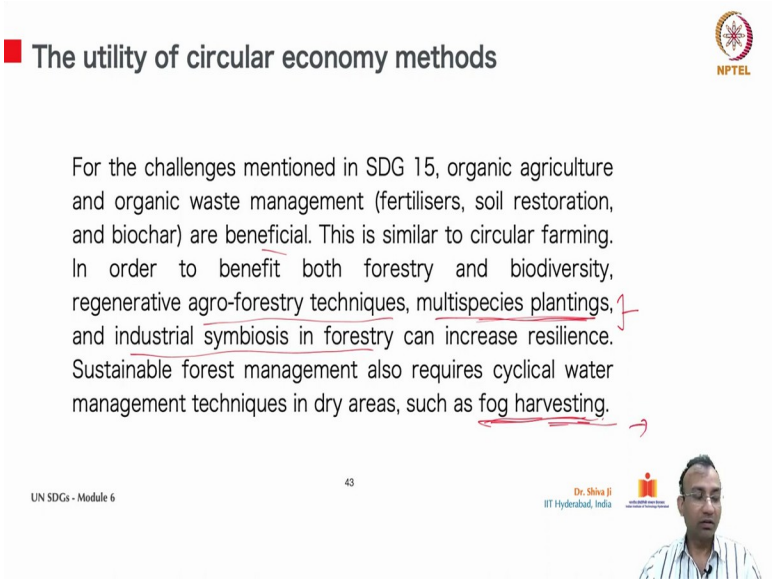

For the challenges mentioned in SDG 15, organic agriculture and organic waste management fertilizers, soil restoration, and biochar are beneficial. This is similar to circular farming. In order to benefit both forestry and biodiversity, regenerative agro-forestry techniques, multispecies planting so that not just one preferred cash crop is planted all the time but multispecies like the plantations, and industrial symbiosis in forestry can increase resilience. Sustainable forest management also requires cyclical water management techniques in dry areas, such as fog harvesting.

So this is also one of the like a techniques. If you go to the cold desert such as like Ladakh region of India, so there like getting like water is a challenge. So some local techniques have been adopted over here to catch like this fog the tiny like water droplets which are suspended in the air and harvest them for water collection.

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Coming down to SDG 17, so there are some numbers, NET ODA, total 149 billion dollars in 2018 down by 2.7 percent from 2017. So that is a relation you can see. In 2018, bilateral ODA to the LDCs fell by 3 percent in real terms from 2017. Aid to Africa fell by 4 percent. So remittance is like a usually like is migrated population actually sends some money back that is remittance will be the largest source of external financing in low and middle-income countries from here actually, a huge migration actually takes place. Temporary or permanent also but mostly like a floating population which goes to other places and they send back like the earnings to their homes.

Current commitment to statistics 0.33 percent of total ODA must be doubled to meet the statistical capacity-building objectives by 2030 in Sub-Saharan Africa less than one-quarter of national statistical plans are fully funded.

Over 80 percent of people in developed countries are online by internet connections compared to 45 percent in developing countries and only 20 percent in low developing countries.

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In addition, developed countries will need to fulfil their official development assistance commitments. Multi-stakeholder partnerships will be crucial to leverage the inter-linkages between the sustainable development. Goals to enhance their effectiveness and impact as well as to accelerate progress in achieving the goals.

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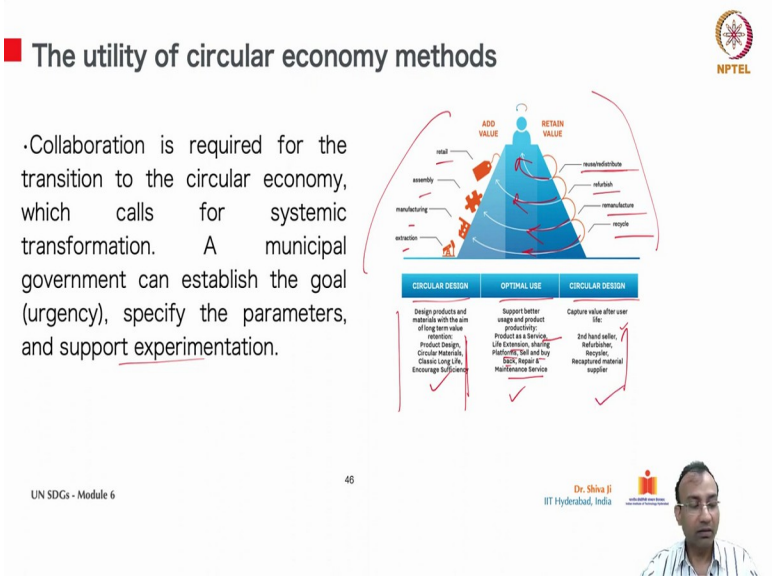

You can see this figure over here. Collaboration is required for the transition to the circular economy which calls for systematic transformation. A municipal government can establish the goal and specify the parameters, and support experimentation.

So you can see in this one circular design points, optimal uses, and circular line points further and then we have like added values system on this side and retain values on the sides. We

have like retail, assembly, manufacturing, extraction, and the values like reusing, redistributing, refurbishing, remanufacturing, recycling are kind of employed over here bringing out a change.

So design products and materials with the aim of long-term value retention. For example, circular materials, etcetera. That is why I mentioned earlier designing investing more into design is very crucial for improving things.

Optimal use support better uses and product and productivity. Product as a service. We discuss life extension, sharing platforms, sell and buyback those thrift stores, repairs and maintenance services in our relationship.

Capture value after user life. Second-hand seller, refurbishes, recycler, recaptured material supplier, etcetera. So those should become part of the mainstream like a system.

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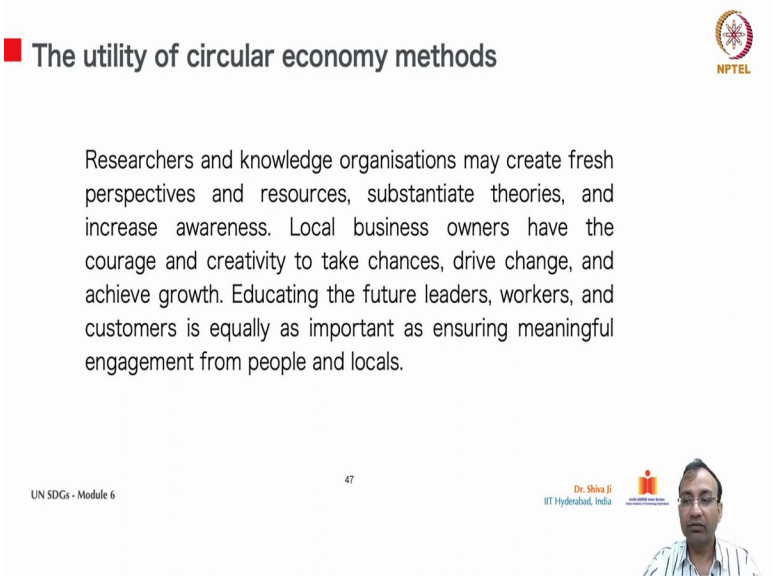

Researchers and knowledge organizations may create fresh perspectives and resources, substantiate theories and increase awareness. Local business owners have the courage and creativity to take chances, drive change and achieve growth. Educating the future leaders, workers, and customers is equally as important than ensuring meaningful engagement from people to locals.

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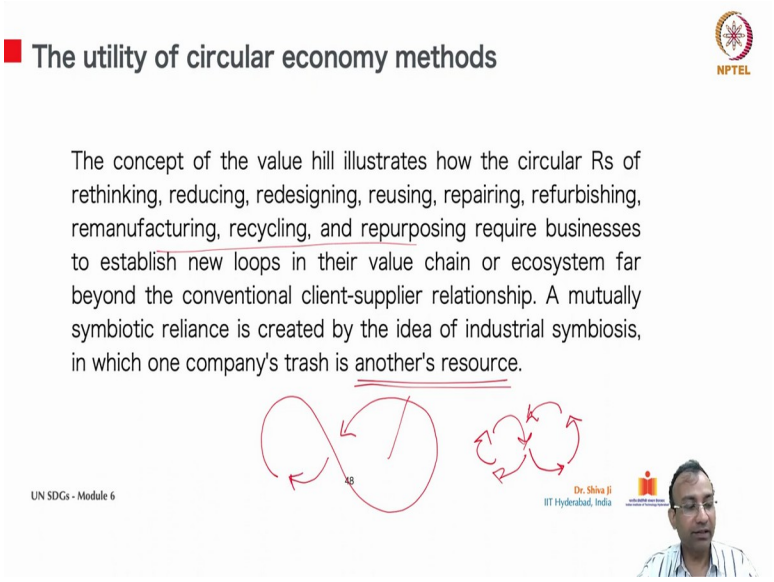

The concept of value hill illustrates how the circular like Rs of rethinking, reducing, redesigning, reusing, repairing, refurbishing, remanufacturing, recycling and repurposing, etcetera like all of those Rs require businesses to establish new loops in the value chain.

Like we saw like in the previous like in here, if you see this is a like a value addition which is happening through these Rs. And again, it can lead to like improvements at each of these stages and optimize the whole like a chain, value chain.

A mutually symbiotic reliance is created by the idea of industrial symbiosis, in which one company's trash is another resource. As I said earlier someone seemed like a waste which is getting exiting in like that cycle can become like the ingredient or like a nutrient for the next cycle. So from one loop it can enter to the another loop and so on. So multiple ways, this cycle of sustainability can take place.

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So now in this one, we will see the topic of design for sustainability where sustainability I think by the time you know what is sustainability and designing for it, designing for sustainability that is design for sustainability, DfS we will see in detail.

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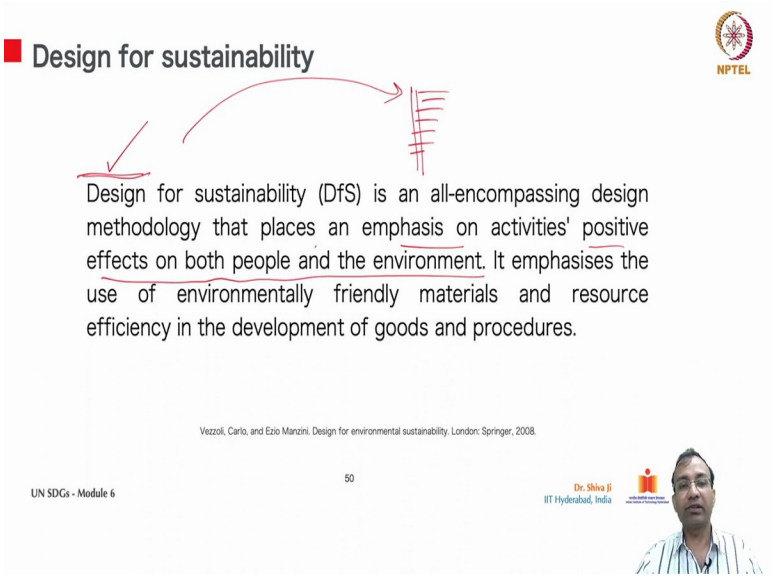

Well, DfS is an all-encompassing design methodology. We have been listening the more focus, more aim more attention, is needed at the design stage because if this is improved and all of the rest of the cycles and the stages are going to get improved.

So this is established like, the emphasis and the consideration at the drawing board stage is essential and crucial for the success of overall like this value chain.

So, it says this is an such a like an all-encompassing design methodology that places an emphasis on activities, positive effects on both people and the environment. So keeping those considerations in mind and then you go to the drawing board and design the product. So it emphasises the use of environmentally friendly materials and resources efficiency in the development of goods and processes.

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The DfS technique is sometimes referred to as a lifecycle design approach since it takes into account details regarding the phases of a product's whole lifespan. So LCA approach also gets utilized in DfS assignments.

Currently, the DfS techniques is being used more often, particularly for the creation of new products and processes, as a result of consumer and industry efforts to become more sustainable.

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Product innovation is one of the areas where the strategy is frequently used. Current new product innovation focuses on the consequences on people and the environment as well as profitability, so all 3. In contrast to the old product innovation methods that only focused on profitability. So in the conventional linear design process, it used to be the focus of only economic gain but with this, the focus has changed.

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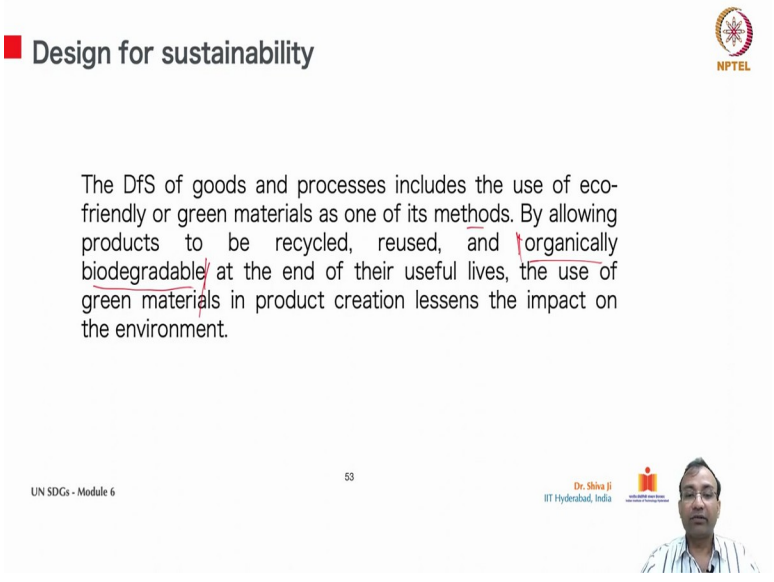

The DfS of foods and processes includes the use of eco-friendly or green materials as one of its methods. By allowing products to be recycled, reused, or organically biodegradable at the end of their useful lives. Organically biodegradable, maybe you would like to search more on

this. The use of green materials in product creation lessens the impact on the environment of course.

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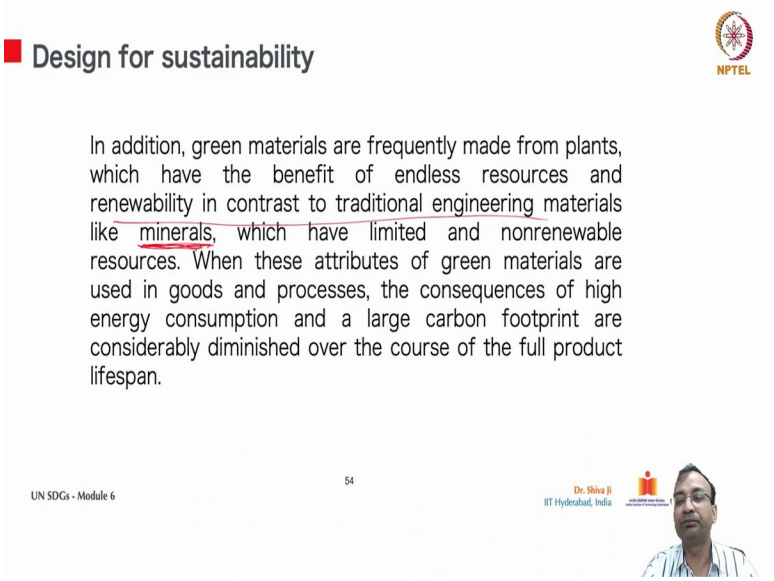

In addition, green materials are frequently made from plants which have the benefit of endless resources and renewability in contrast to traditional materials like minerals because now it is once it is like a manufactured again it is very difficult to like bring it back to the original like a state of like material, which are limited and non-renewable resources.

When these attributes of green materials are used in goods and processes, the consequences are high energy consumption and a large carbon footprint are considerably diminished over the course of the full product lifespan.

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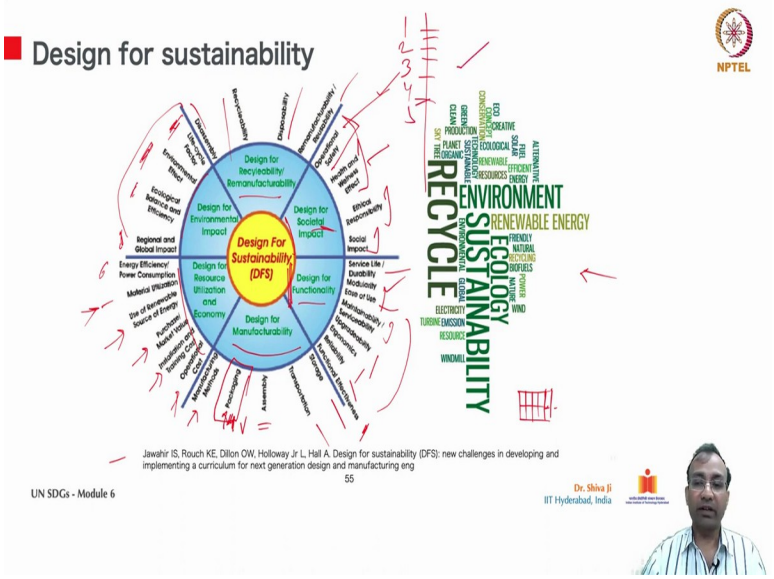

You can see in this illustration the different aspects, different keywords associated with this. So there is this word cloud from this source. So design for environmental impact, lifecycle factor, you need to consider, environmental effect, ecological balance and efficiency, regional and global impact. Overall, in the design for recyclability, remanufacturing you need to consider for disassembly, recyclability, disposability, manufacturability, reusability etcetera.

Then for societal impacts like social dimensions, operational safety, like how safe it is to operate like machines and tools. Sometimes they end up hurting the operators. Health and wellness effects like ergonomics is one of sciences where we study about like impacts of like a such a thing on the human body like physical or even mental also.

And there are even some wellness effects also like VOCs and things we discussed or if something has a physical as well as psychological impact that needs to be revised and reconfigured to have like a minimal impact. Ethical responsibility, social impacts.

Then for functionality, functional improvements, service life, durability, modular, ease of use, maintainability. You may be aware like this modularity is one of the new qualities where you can bring in like multiple of the same like an object in multiple numbers and configure your stuff.

So in all the sizes and fittings and all of those details are similar and universal. So it is easier for you to modulate in multiple like a numbers and quantities. So easily you can make use of this thing. Upgradability, ergonomics, reliability, functional effectiveness. So they all come under here.

Then for manufacturability, manufacturing methods, the less impacting methods, packaging solutions because one of the most waste producing element from like a manufacturing industry is the packaging. So an extra focus is needed on this one. Assembly, transportation, storage.

And then design for resource utilization and economy, energy efficient like systems, material utilization maximum like utilization and optimization, use of renewable sources of energy, purchasing like a market value, installation, and training costs, operational costs, etcetera.

So if you see this DfS actually encompasses like a variety of strategies inside this. And they are all essential. It depends on how, what to choose and how to choose etcetera, that depends on your context. What you are designing? In what kind of context and scenarios? So based on

that, you can take a call and you can make a prioritization of these strategies and then you can take up your designing project.

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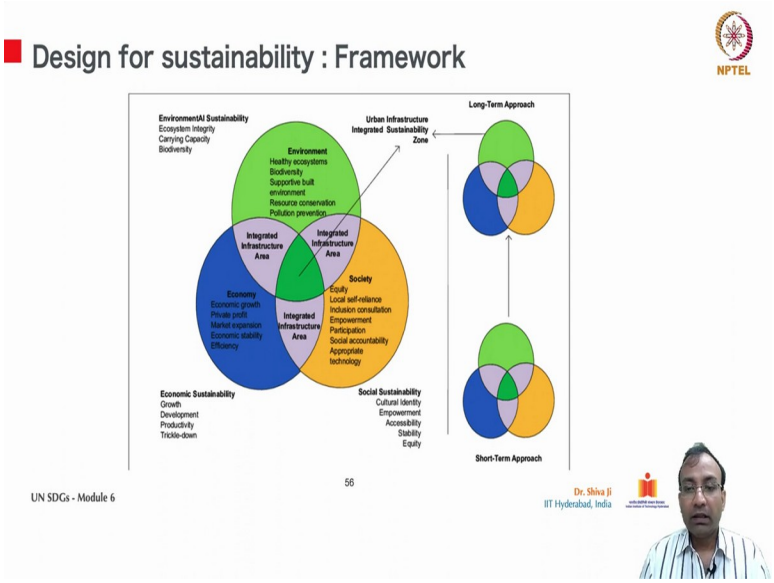

So, ESE aspects and their overlaps. So from short-term approaches to the long-term approaches at major level like city level, urban planning level, and all of that, the impacts are there.

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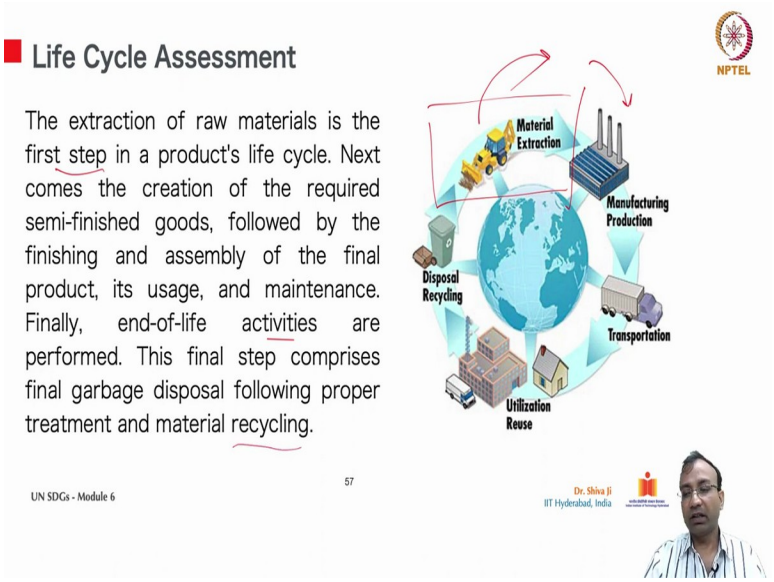

The extraction of raw materials. On the LCA on the side if you see, so this is the stage which talks about material extraction. So this is the first step in the product's lifecycle. From there you get your resources like your ingredients and then you go for like a second stage.

Semi-finished goods, and then followed by finishing and assembly of the final product, its usage, maintenance and finally, end-of-life activities. This final step comprises final garbage disposal, following proper treatment, and material recycling at the end of it. It comes to the end.

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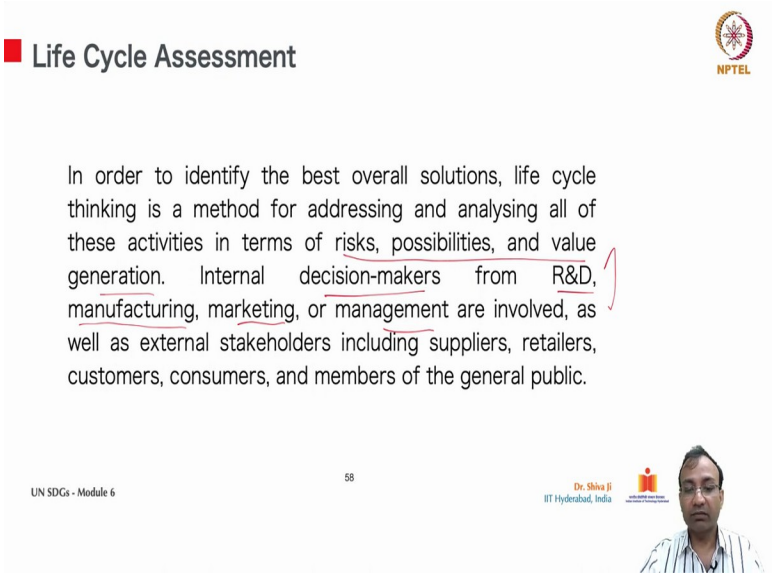

So, LCM, in order to identify the best overall solutions, lifecycle thinking is a method for addressing and analysing all of these activities in terms of risks, possibilities, and value generation.

Internal decision-makers from R and D, or designers who are sitting on the table, engineers it is helpful for them. Even manufacturing units and what materials and combinations they are going to use, marketing people, management are all involved in such exercises as well as external stakeholders including suppliers, retailers, customers, consumers, and members of the general public.

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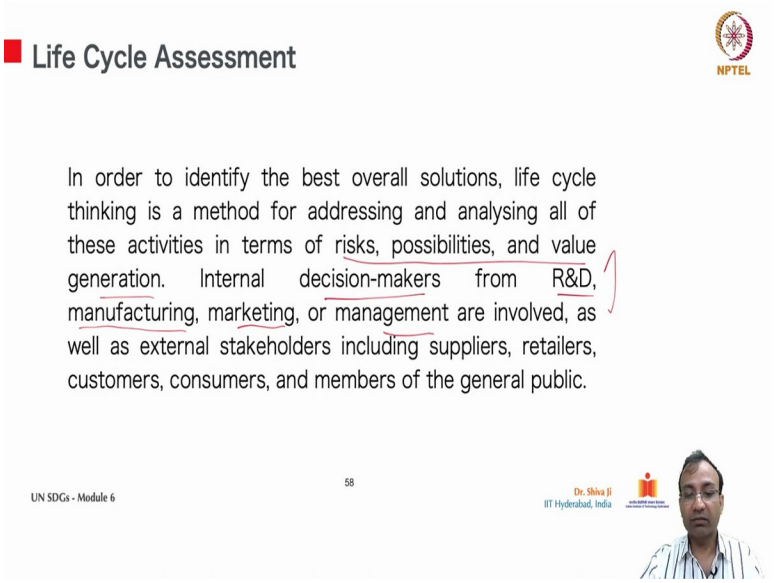

So analysis steps are calculating the overall energy and material inputs, environmental outputs, addressing any potential effects on the environment, and analysing the outcomes throughout the life of the product and even at the end of it.

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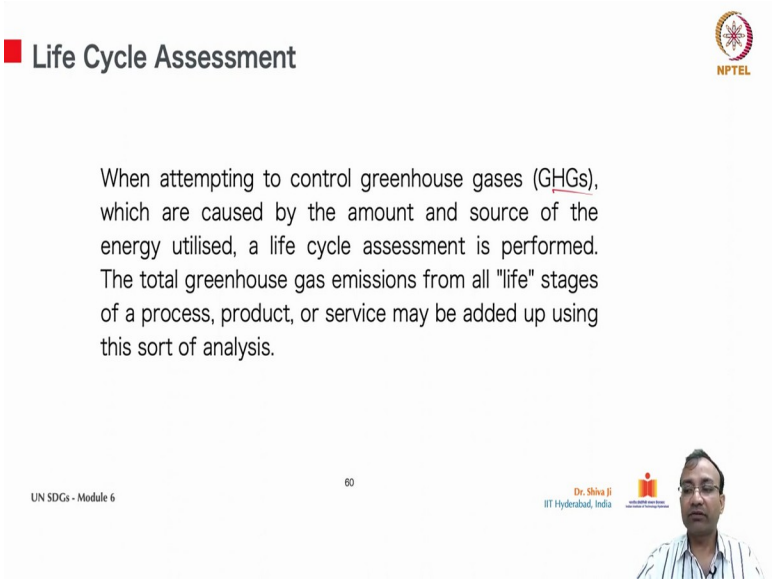

When attempting to control greenhouse gases GHGs, which are caused by the amount and source of the energy utilized a lifecycle assessment is performed. The total greenhouse gas emissions from all “life” stages of a process, product, or service will be added up using this sort of analysis.

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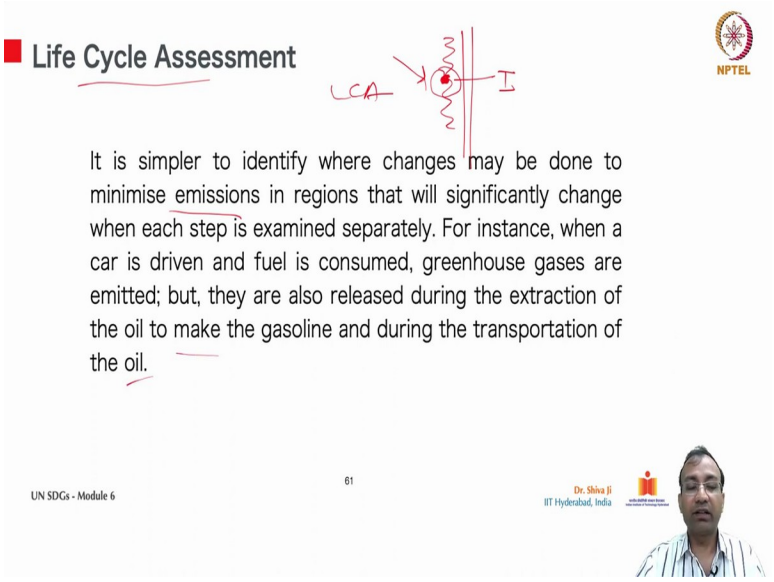

So that is where LCA is an important tool. It is simpler to identify where changes may be done to minimize emissions. Because if at different stages where to make, where has the largest impact, you can definitely pin pointedly like work on this and improve this whole value chain.

For instance, when a car is driven and fuel is consumed, greenhouse gases are emitted, but they are also released during the extraction of oil to make the gasoline and during the transportation of the oil. So you can calculate which one has how much potential and how much of correction you can do.

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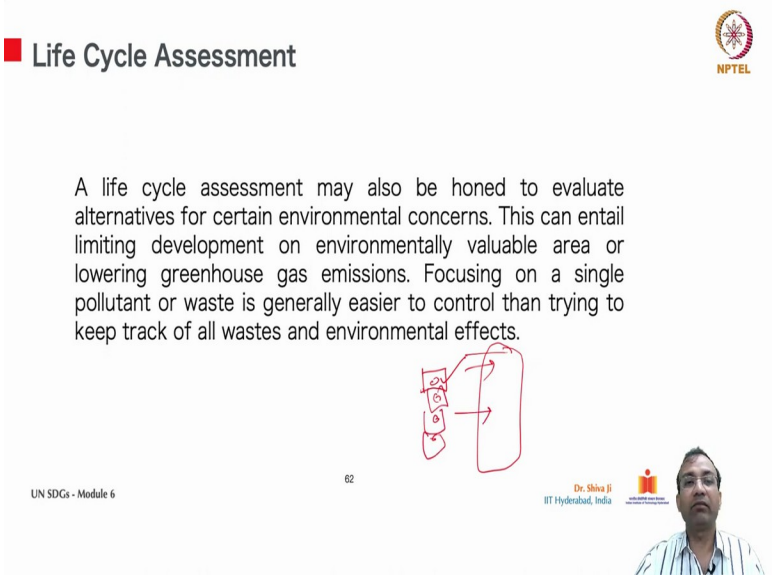

So LCA may also be honed to evaluate alternatives of like certain environmental concerns. This can entail limiting development on environmentally valuable areas or lowering greenhouse gas emissions. Focusing on a single pollutant or waste is generally easier to control than trying to keep track of all waste environmental effects.

So maybe you can go in one by one. That is what it is suggesting. Because if you are able to address one properly, definitely it is going to improve the whole like the system and then gradually all of them improved, gradually the whole system will get improved.

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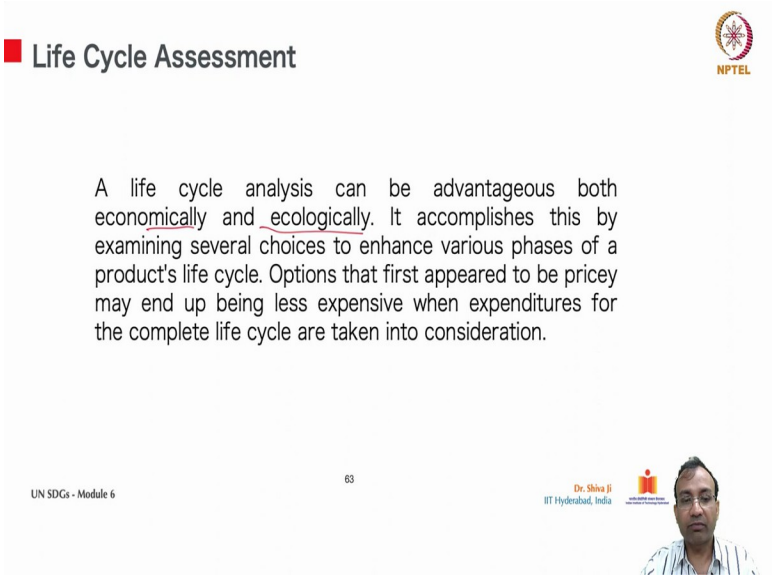

LCA can be advantageous both economically and ecologically. It accomplishes this by examining several choices to enhance various phases of a product’s lifecycle. Options that first appear to be pricey may end up being less expensive than expenditures for the complete LCA.

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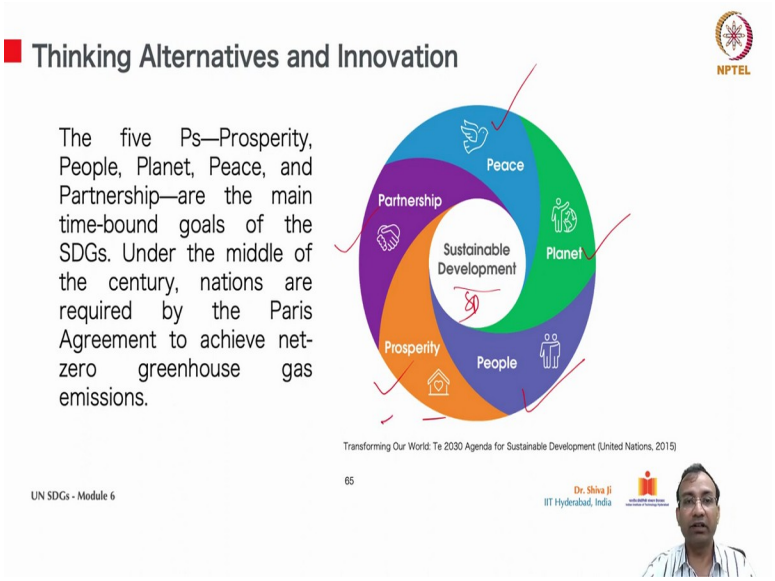

So now we are entering to the third topic, Thinking Alternatives and Innovation. So we will see the sustainable development practices what they propagate. It begins with the people, people-centric approach, then considerations about the planet of course, overall peace and prosperity, partnerships, collaborations and prosperity overall. So this together forms a SDG, the 5 Ps they are listed over here.

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So around this like, how things can be developed. So this being as like a conceptual framework. Paris agreement's SDG 13 on climate change refers to the UN Framework Convention on Climate Change, saying that it "is the principle international, intergovernmental platform for negotiating the global response to climate change."

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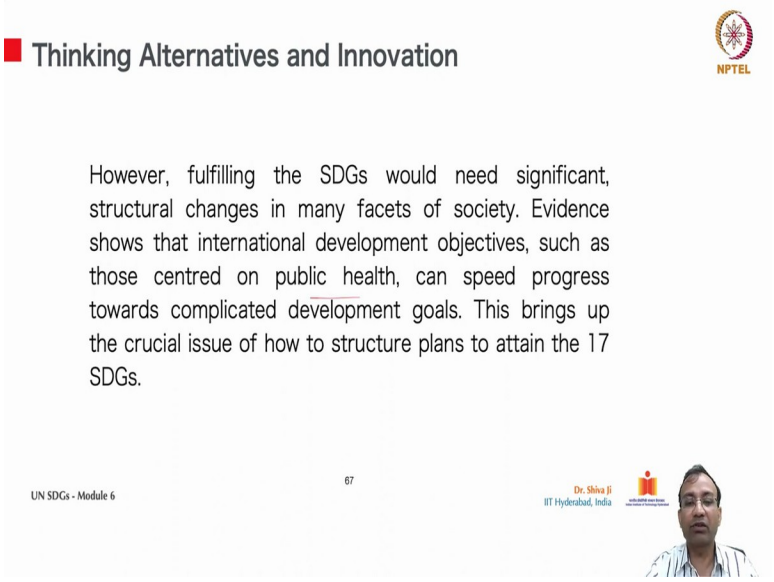

However, fulfilling the SDGs would need significant structural changes in many facets of society. Evidence shows that international development objectives, such as those centred on public health, can speed progress towards complicated development goals. This brings up the crucial issue of how to structure plans to attain the 17 SDGs.

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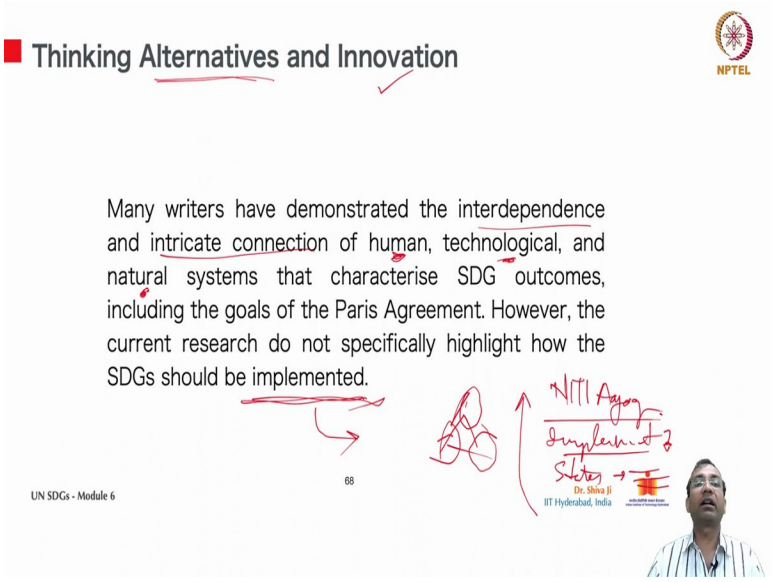

So like in implementation, there are challenges and other conditions. So where to kind of intervene that also may depend upon every country to country. Like inside country also, state to state. So considering those points and bringing them for like alternative thinking and innovative ways in which those can be taken out.

Many writers have demonstrated the interdependence and intricate connection of human, technological, and natural systems like connect those 3 things and including the goals of the Paris Agreement. However, the current research do not specifically highlight how the SDGs should be implemented.

So this implementation actually is left on countries to devise their own way. So you may be aware in India it is like NITI AAYOGEC. It is this rural agency at Indian level, at Indian country level which actually plans for the implementations, and then it delegates those like implemented techniques and tools to the states, and then at a state level also things happen; at the district level and then again the lowest administrative level.

And then again, gradually it gives its feedback like a loop to the above and then if there is any other improvement or correction, then again it percolates down from top to bottom, then bottom to up.

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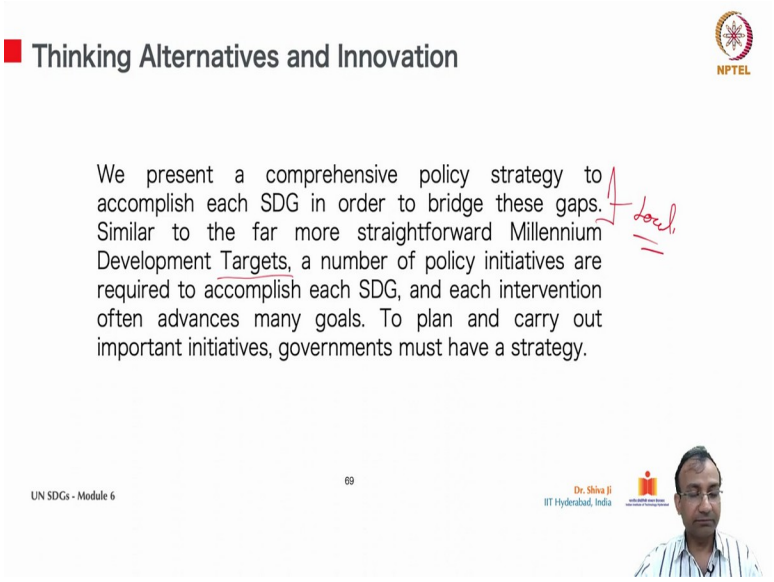

So comprehensive policy strategy is needed to accomplish each SDG in order to bridge those gaps. Because those gaps are like a local gaps, they are not; we cannot generalize or universalize these details. Similar to the far more straightforward Millennium Development Targets, a number of policy initiatives are required to accomplish these SDG, and so for the...

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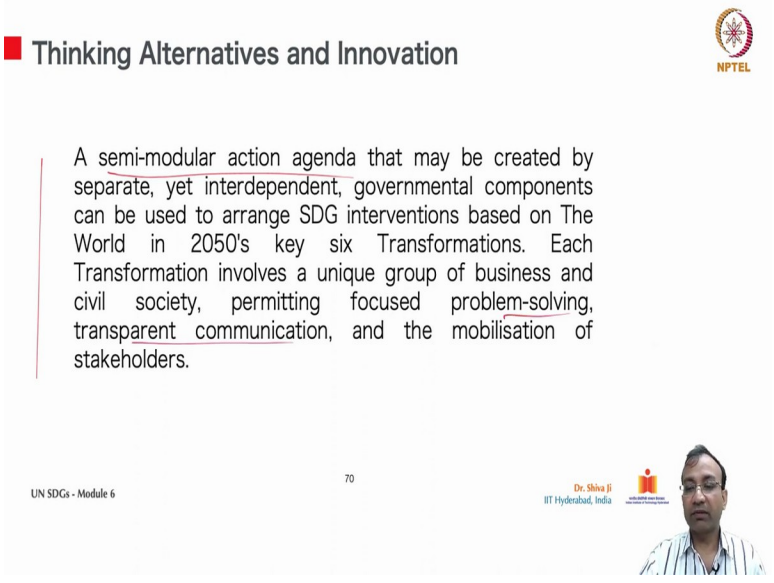

So these are the challenges which you may face if you are kind of a part of an organization which is working for the implementation of SDGs. You may be, you are well aware of these. Maybe in one of your assignments or the final project, you share, like those and look for the local solutions in what ways like you may deal or have already dealt with in the past. So maybe you can talk about your solutions given.

So semi-modular action agenda that may be created by separate, yet interdependent, government components can use to arrange SDG interventions for problem-solving transparent communication and mobilization of stakeholders. We have studied before.

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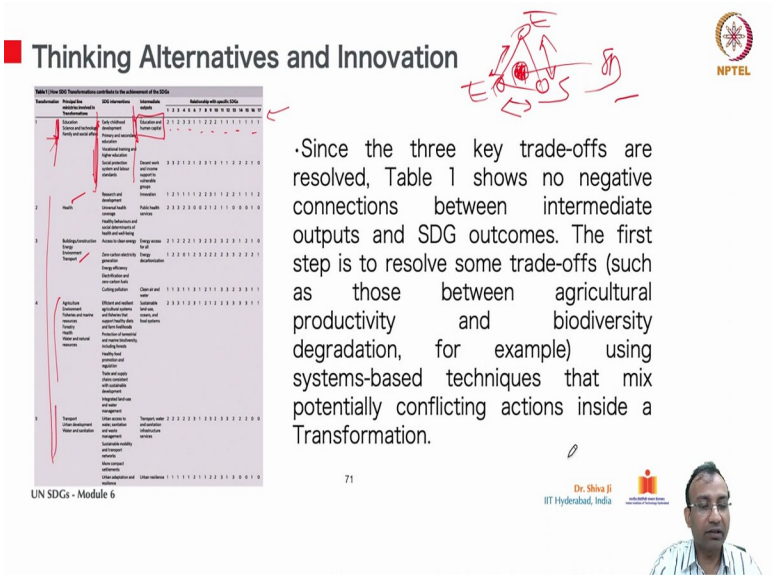

Since the 3 key trade-offs are resolved. So like we saw those at the cusp of these Eses. It is a trade-off between like these and collectively there is a trade-off and the final things happens over here in the middle, that we call it as SD. So this what these trade-offs can be, you can see here on this table. That is given on the left side.

So for transformation like 1 principal line ministries involved in the transformation like education, science and technology, family and social affairs. So 3 ministries we see over here and then SDG intervention. So what all are possible through these? Like early childhood

development, primary-secondary education, vocational trainings, higher education, social production systems, and labour standards, they all can come and become a group for this thing and intermediate outputs, education and human capital development.

So in relation to the SDGs like, you can see 1 2 3, 1 2 3 it goes like this data is fed over here. similarly, we have like most of the major industrial-like sectors like health, building construction, energy, agriculture, environment, forest health etcetera, then urban transportation and water sanitation etcetera and SMT telecom.

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So the motto is, leave no one behind. So transformation 1 education, gender and equality and health well-being and demography, energy decarbonization, sustainable industries. Then food, land, water resources like natural domain and then sustainable cities and communities and then finally, overall transformation and social development.

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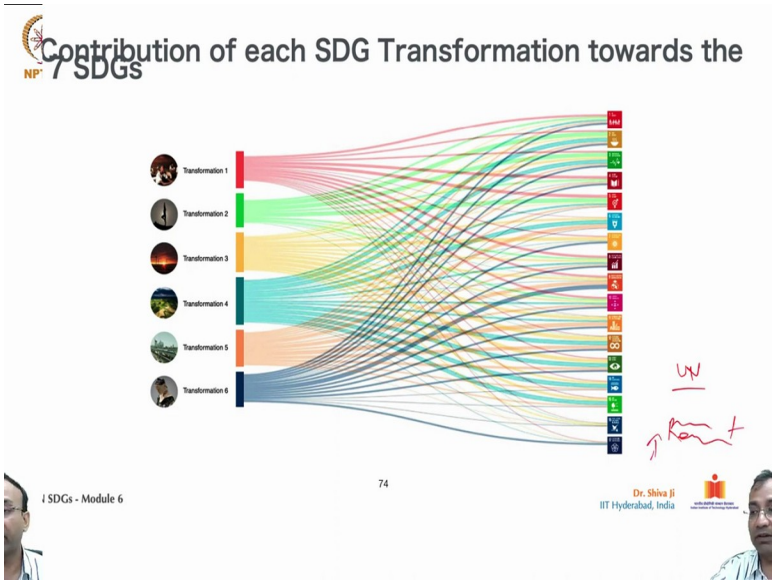

Relationships you can see over here. Well, this kind of data are all available in majority of the books which I have shared in the description. Maybe you guys can have a look and UN has released several reports and documents. Maybe you can refer them for more detailed data and case studies specific case studies from different countries that will be helpful for your projects.

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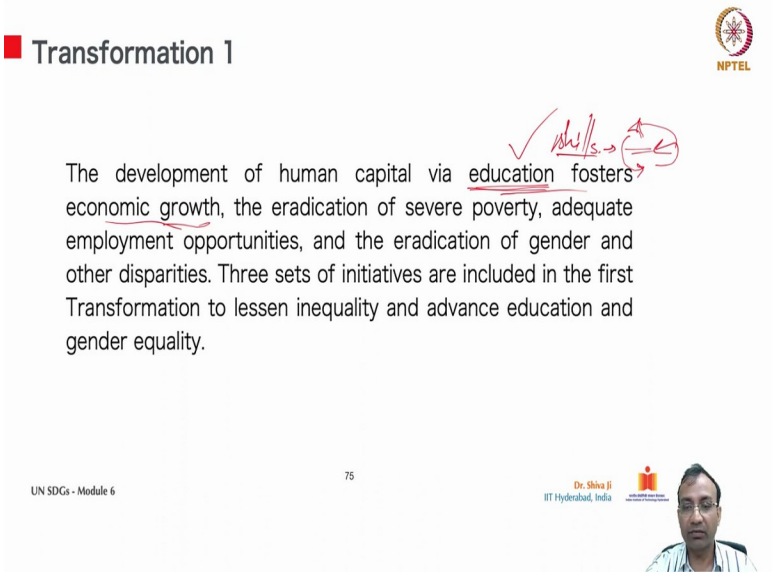

The development of human capital via education fosters economic growth, because once educated you may be possessing certain skills and you may contribute directly to some industry, some sector and like make use of that to earn for yourself and in turn into like a becoming a responsible citizen, and a productive person in the overall system.

The eradication of severe poverty, adequate employment opportunity. and eradication on gender and other disparities. So with the overall education, a purpose is far larger than just scaling and giving you some knowledge and as an overall effort for improvement at the social level, at the human level, 3 sets of initiatives are included in the first Transformation. That we have seen.

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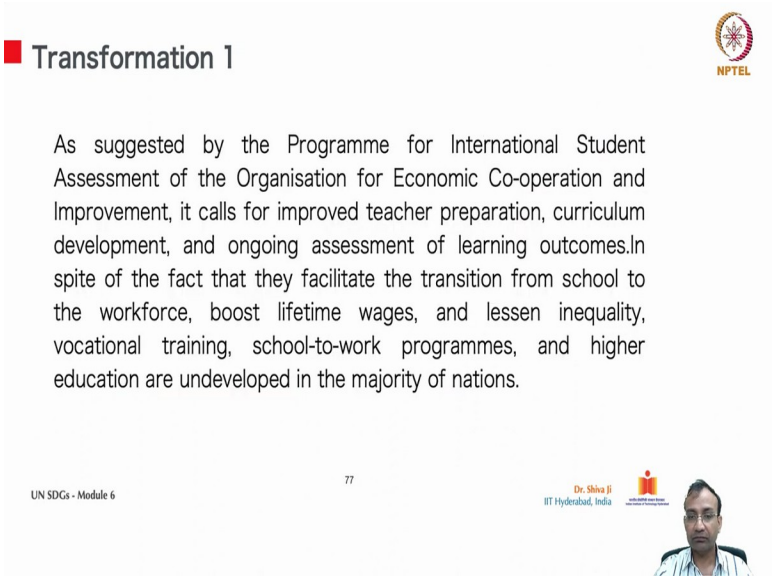

So that is why it was strengthening educational institutions is a must-must for any country's overall growth and development in the future. If you are strong in science and technology, if you are strong in education, if you are strong in research, you will definitely you will have like a advantage to proceed faster and you and longer in terms of like new adoptions and developments.

Even in high-income societies, investments in early childhood development have lagged behind the benefits to children's cognitive and emotional growth that last into adulthood. So these have the potential to like affect till the whole of your life.

The foundation of the educational system is access to high-quality elementary and secondary education. So, beginning from like a level 0 till the top like level primary, secondary, tertiary and all of those and like education levels, one must go for like quality education.

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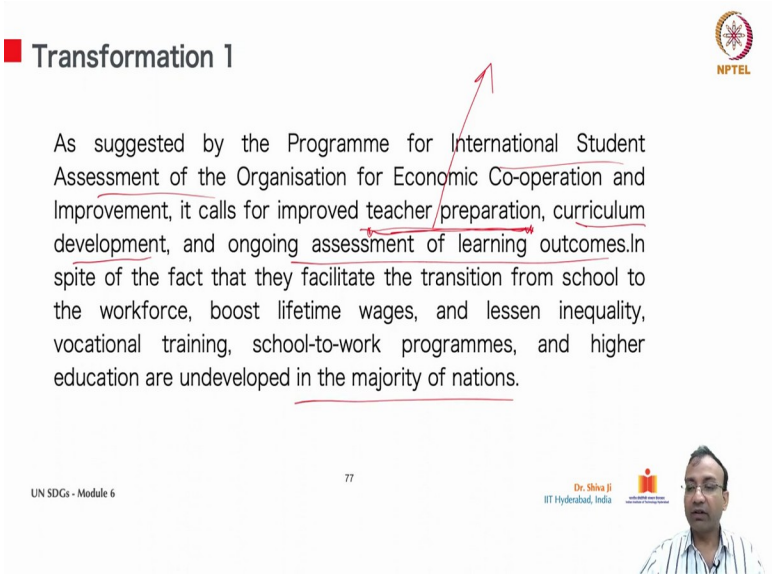

So several schemes and programs are coming. So in this one, you can see the transformation I suggested by like this thing International Student Assessment of Organisation for Economic Co-operation and Improvement, calls for improved teacher preparation because the teachers are the pillars of education. They are the ones who are empowering more and more like people. So the basic and must investment that should happen at this stage.

Curriculum development like the most efficient and state-of-the-art curriculum. So that the latest piece of information and knowledge can be given. Ongoing assessment of learning outcomes. So it should be in order keep tags on like checks and measure to improve it.

In spite of the fact that they facilitate the transition from school to the workforce, boost lifetime wages and lessen inequality, vocational training, school-to-work programs, and higher education are undeveloped in the majority of the nations and this is why this must be focused.

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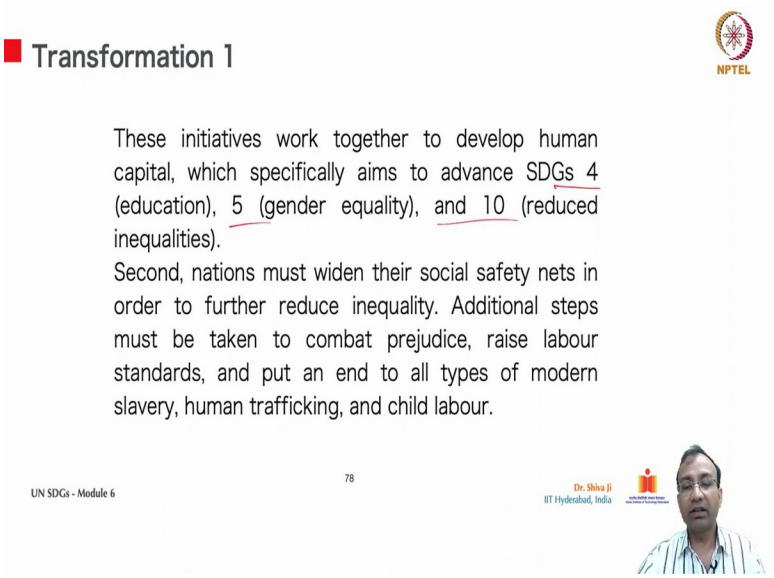

These initiatives work together to develop human capital, which helps directly to many of the SDGs and indirectly also to others.

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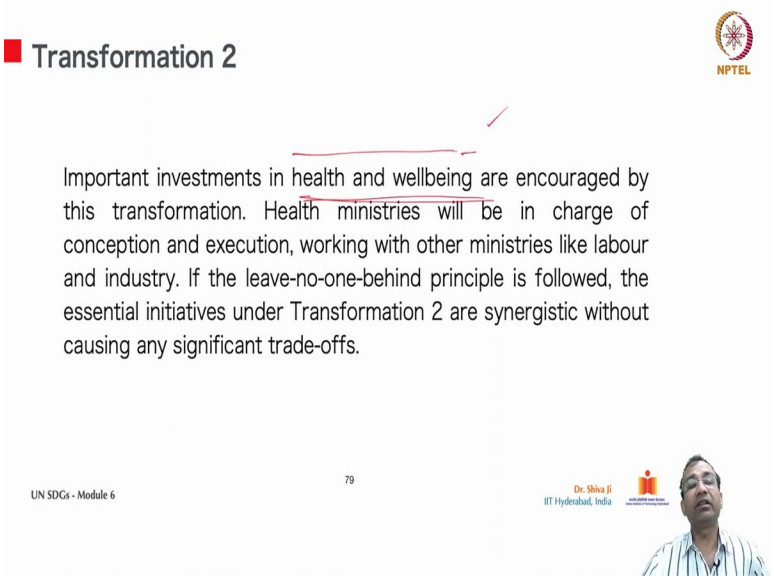

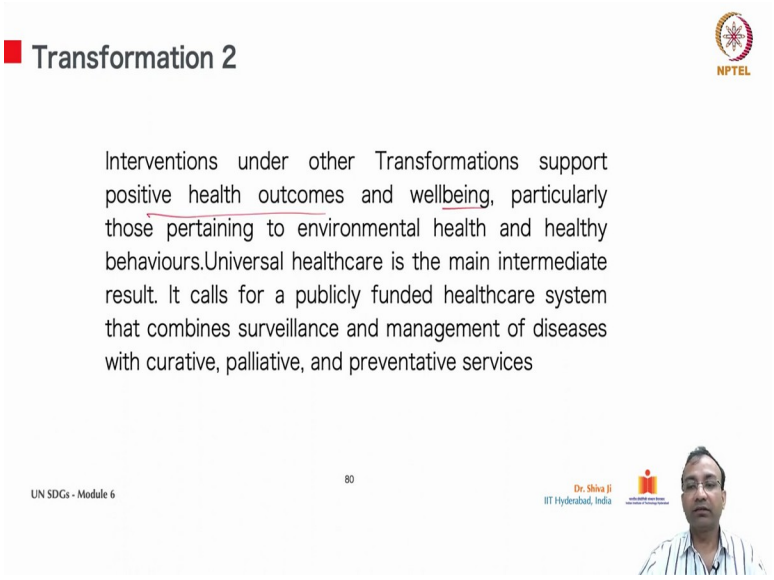

Transformation 2. Important investments in health and well-being because only a healthy person, physically and mentally will be in the right state of mind to contribute whatever he or she is actually working on doing. So it is very essential. Otherwise, the person is going to get like a disease and condition, will become a further burden on the society. So positive health outcomes and well beings.

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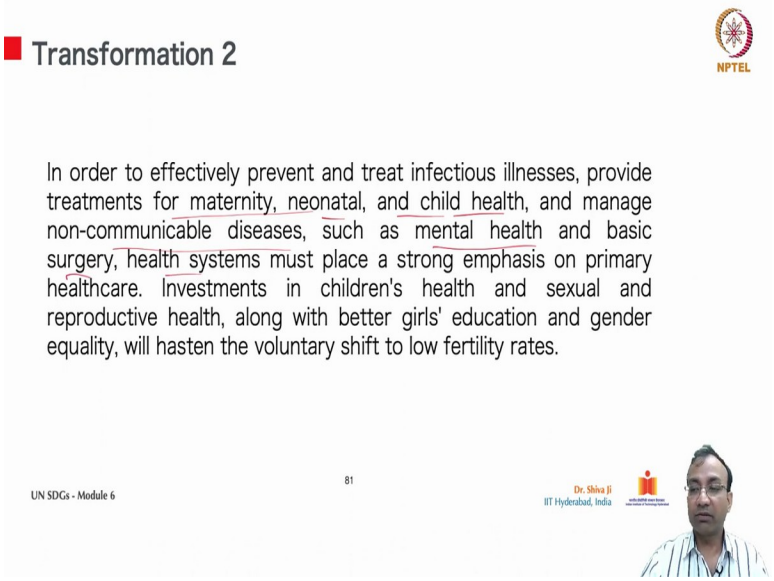

In order to effectively prevent and treat infections, infectious diseases, illnesses provide treatments for maternity, neonatal, child health. So beginning from the initial days of the birth of a child till the elderly age this health security also should be granted as a must and manage non-communicable diseases. So easily in mental health, you can see. Just found, like mentioned here, basic surgery, health systems must place a strong emphasis on primary health care.

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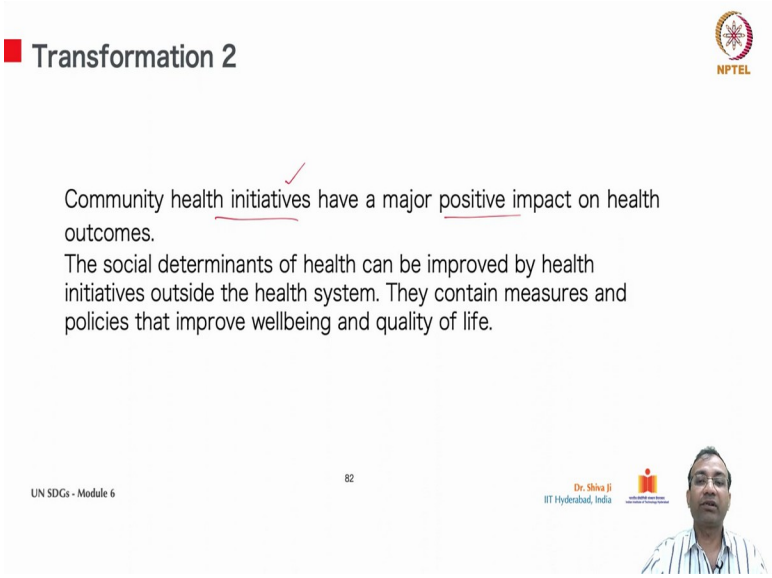

Because it has major positive impact on the health outcome. So such initiatives must be promoted.

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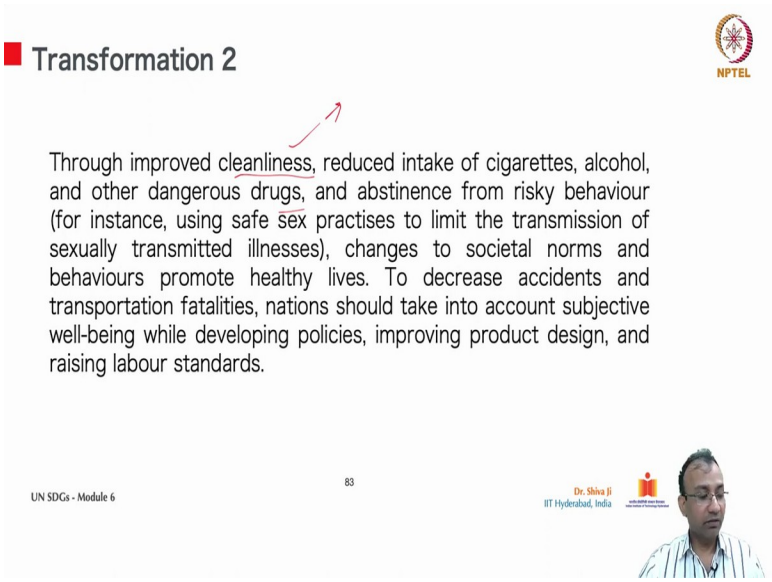

Through improved cleanliness. In this first example you may be aware Government of India, some time back took it as a national challenge to clean our vicinity. So that is one of the like most amazing like a national drive in the recent like a decades and there was like a significant improvement. Well, there is a lot more to do but this persistent effort from all the stakeholders is definitely needed to achieve the goal.

Reduced intake of cigarettes, alcohol, and other dangerous drugs, to reduce them and remove them finally. Abstinence from risky behaviour. So like such things cause issues individually. And finally, if an individual is affected and the whole system is getting affected.

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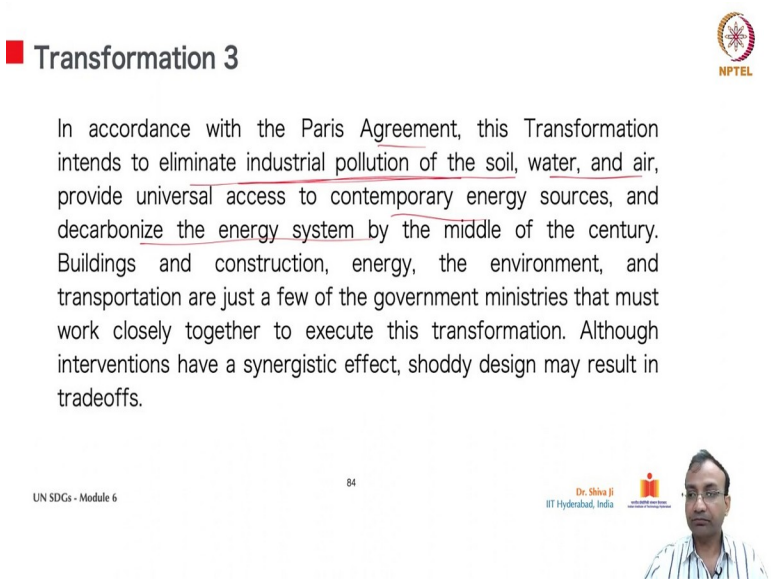

In accordance with the Paris Agreement, this Transformation, the third one intends to eliminate industrial pollution of the soil, water, and air. So all sorts of pollution and how these can be eliminated completely. Provide universal access to contemporary energy sources, and decarbonized energy systems.

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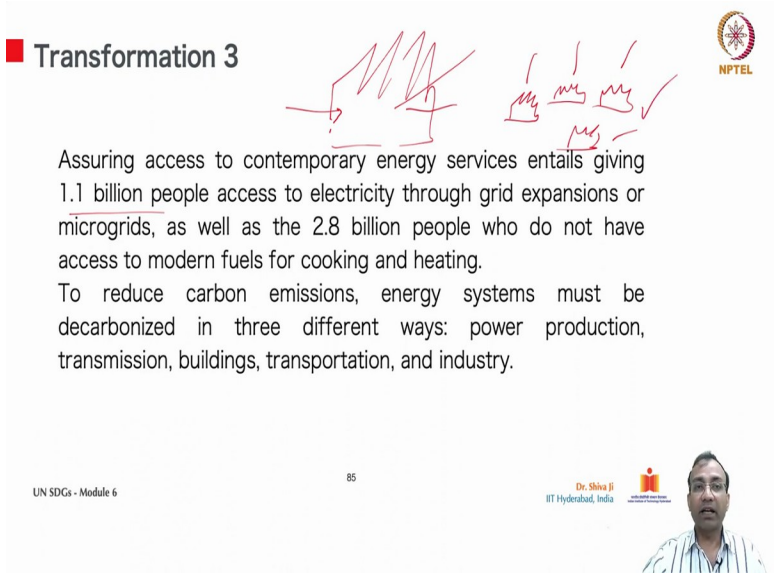

So assuring access to contemporary energy sources entailing entails giving 1.1 billion people access to electricity through grid expansions or microgrids. So instead of having very large

like our industrial or energy generation units we can go for small-small like multiple ones at different places. I think that is one of the like a distributed economic system or like models which helps like a concentrated, even like invested or concentrated conjunction of resources to distributed consumption and investment. So that is the most efficient one. It helps reducing the migration of people and migration of resources also.

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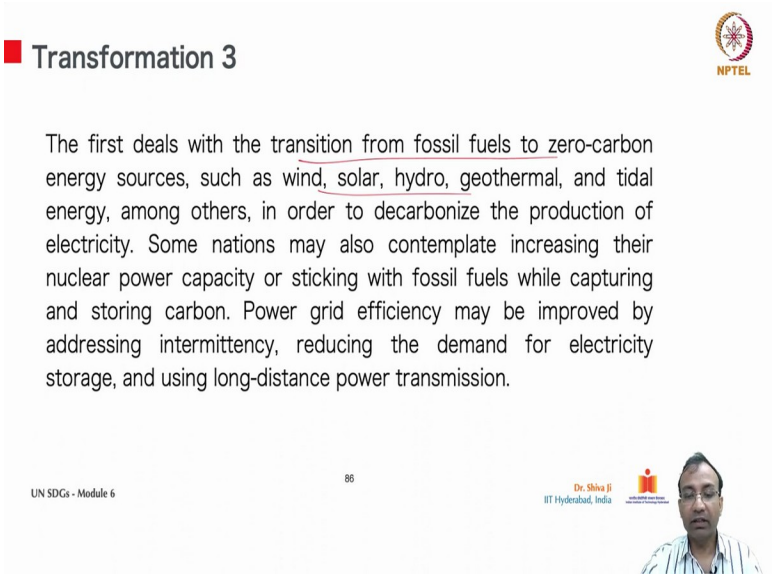

So transition from fossil fuels of course to the like a carbon neutral like energy sources like natural sources we know like wind, solar, hydro, geothermal, etcetera which have like a low impact. Well, energy storage being still one of the polluting ones but I am sure in the recent in a few years we will have like much greener solutions of those types also.

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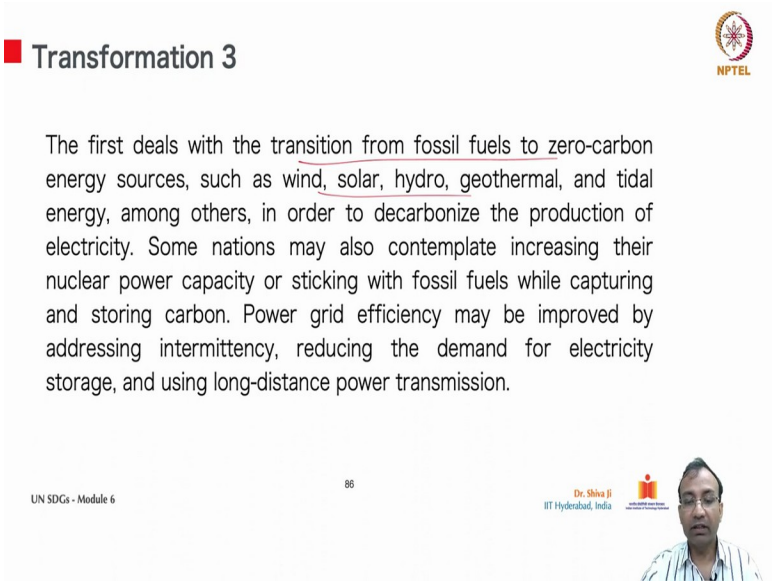

Must increase the efficiency of their ultimate energy uses which include transportation, building heating, etcetera, cooling in HVAC, industrial energy uses.

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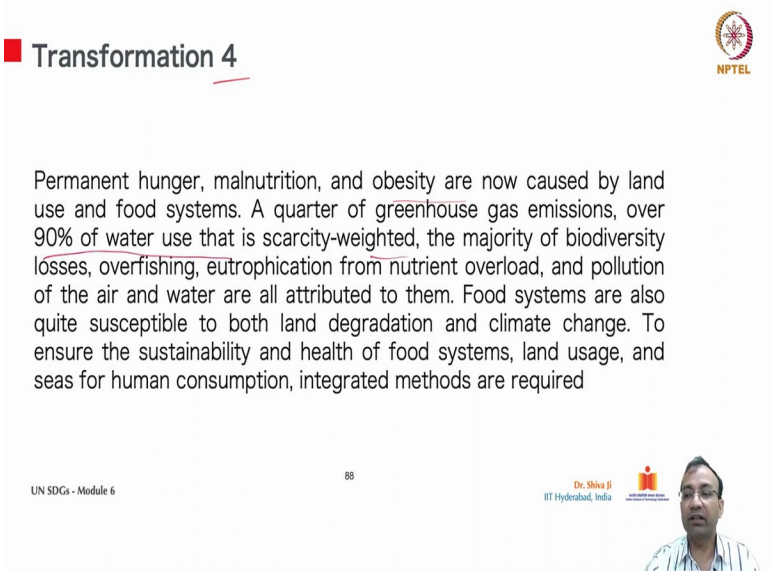

Permanent hunger, malnutrition, and all related to that transformation 4, and obesity are now caused by land use and food system. A quarter of greenhouse gas emissions, over 90 percent of water use that is scarcity-weighted. So those also require transformative change.

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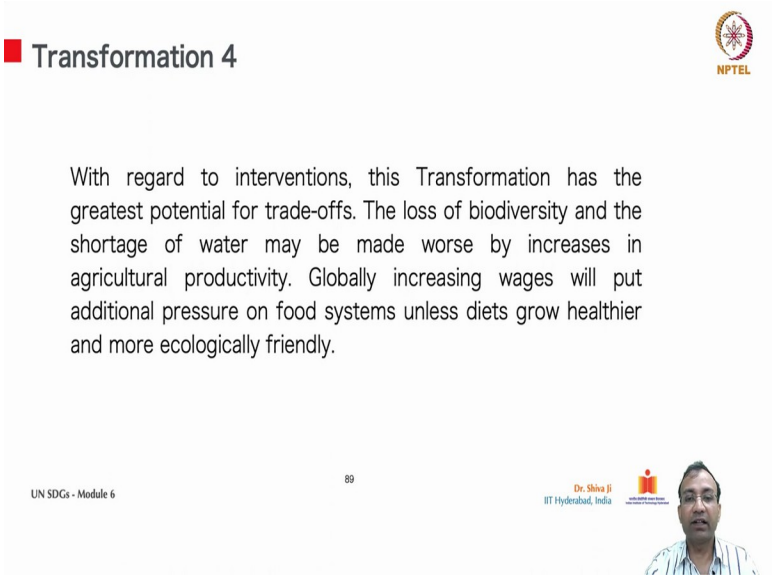

And with regard to interventions, this Transformation has the greatest potential for trade-offs. The loss of biodiversity and the shortage of water may be made worse by increases in agricultural productivity because it consumes, agriculture consumes a huge amount of water.

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First intervention area focuses on fisheries and production. So in this one like depending upon the local or regional requirement, one can focus and then this has directly relation to the food systems also.

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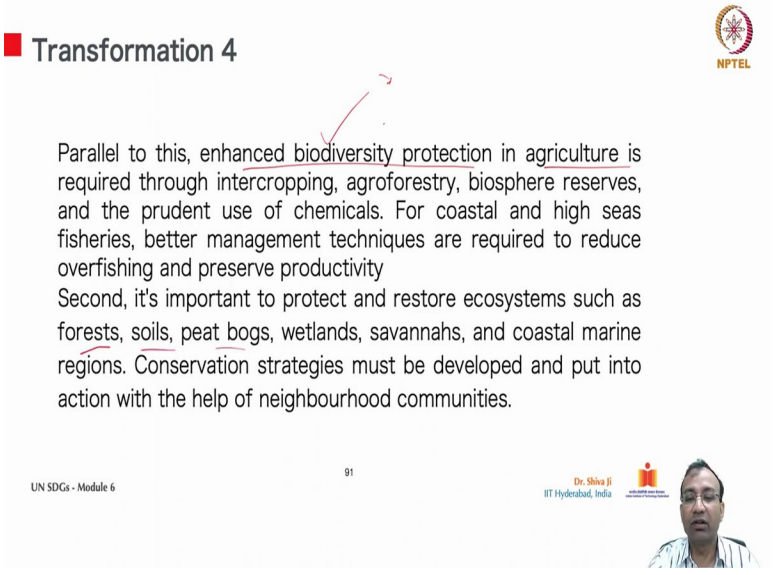

Protecting biodiversity, enhancing it with the help of connecting with the agriculture. You may be aware, rice fields in Assam or many other countries also they use natural like elements such as fish and like ducks for like an insect like handling insects.

And their droppings further help like, boosting fertility of the soil. So it is a win-win situation. In both hands, you can see it helps biodiversity. So such local solutions should be devised to help forest, soil, peat bogs, wetlands, savannahs, and other places.

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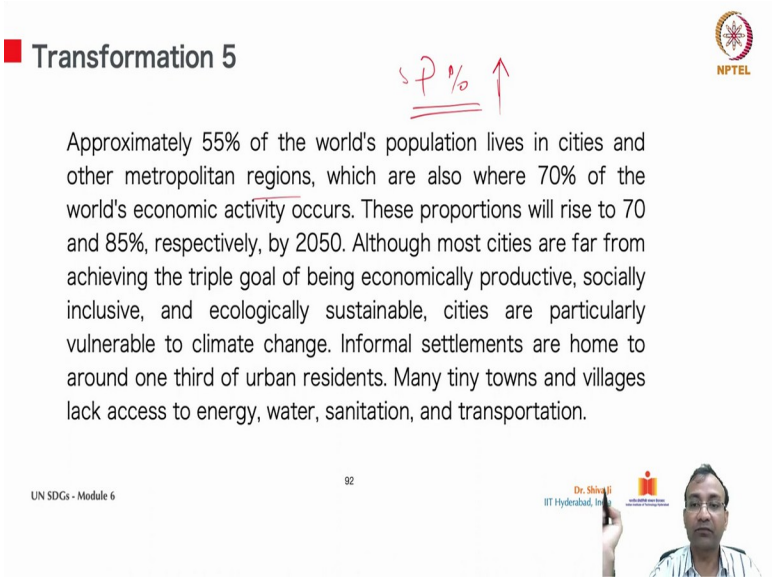

For 5, for the fifth one, approximately 55 percent of the world's population lives in cities and other metropolitan regions. Well in India also conventionally this percentage is increasing slowly over the last decades. It has increased tremendously and even smaller towns are growing into bigger towns. Bigger towns are growing into cities. Cities are growing into the megapolis and things like that. So this overall percentage of the population living in cities, in urban areas is increasing tremendously. So there is a balance what is needed.

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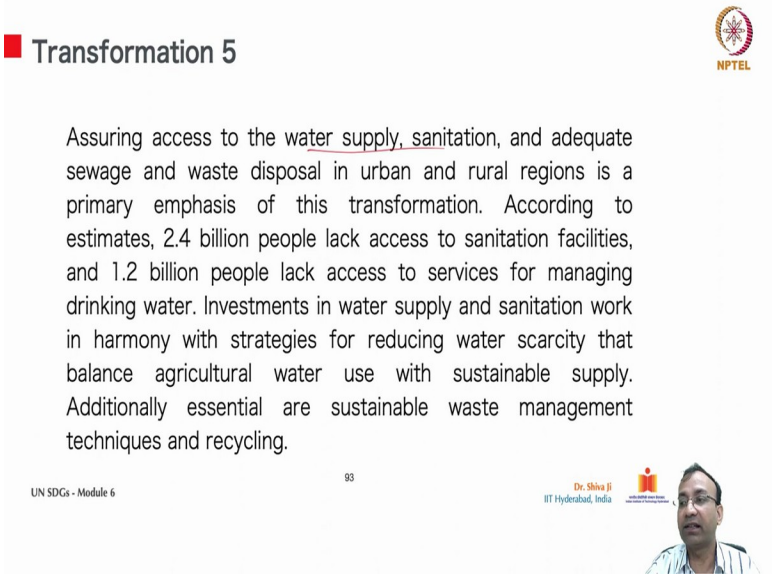

And that population actually requires like all sorts of facilities and amenities, water supplies, sanitation, and adequate sewage and waste disposal etcetera and along with health, education and livelihood, employment and all of those opportunities.

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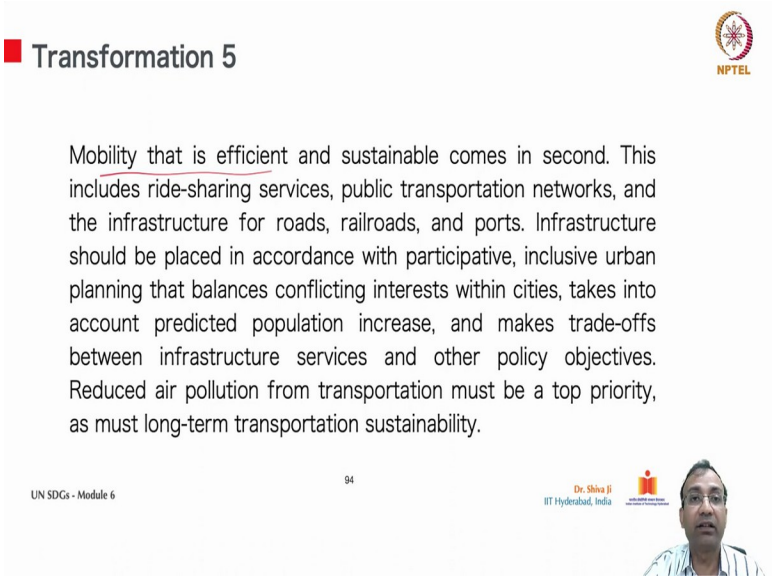

Mobility, another important factor, transportation, and mobility. Because this also contributes sometimes directly and sometimes indirectly to the SDGS and overall like energy consumptions, overall impact, overall LCA analysis. So how this can be brought into an efficient system?

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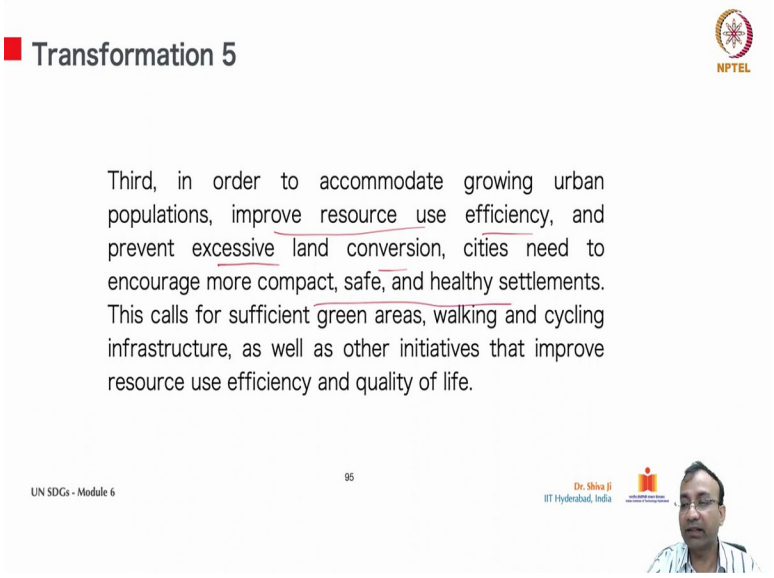

So to improve efficiency, preventing excessive land convergence, cities need to encourage more compact, safe and healthy settlements so that there are sufficient habitable areas.

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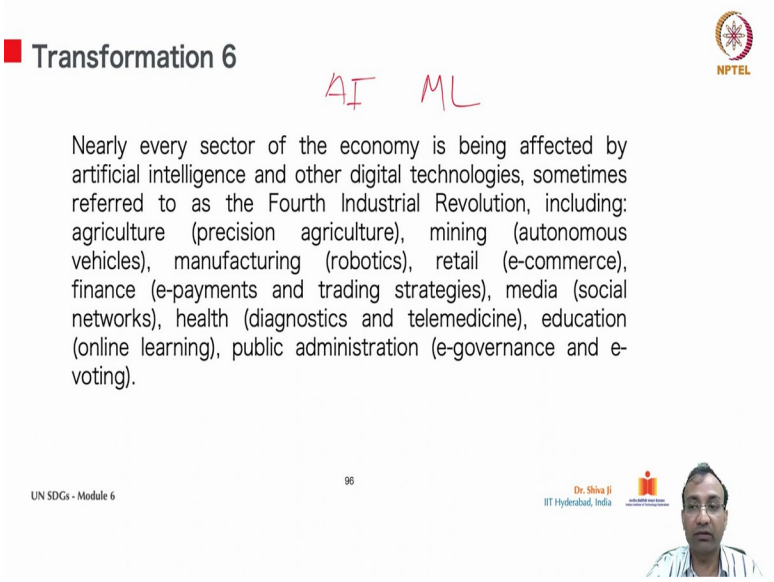

Every sector economy is being affected by artificial intelligence. So like using state-of-the-art technologies like AI, machine learning and all, also may like, help you empower you in growing for solving these tough solutions, tough situations, with efficient solutions.

So with the help of like a such like technologies we can even like go for their applications in all of the sectors. No need to take the names, but I think applications are really, really like an immense like potential.

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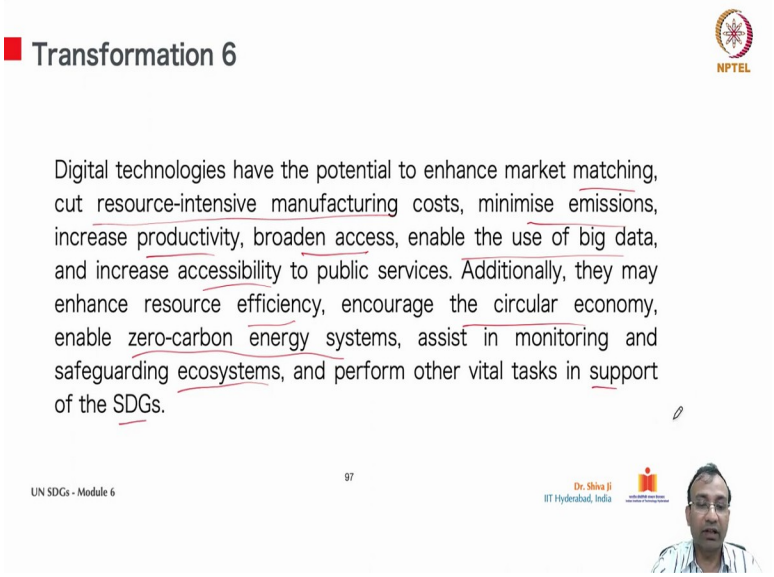

Digital technologies have potential to enhance market matching, cut resource-intensive manufacturing costs, minimize emissions, increase productivity, broaden access, enable the use of big data, increase accessibility to public services.

Additionally, they may enhance resource efficiency, encourage the circular economy, enables the zero-carbon energy systems, assist in monitoring and safeguarding ecosystem, performing other vital tasks also to support often like all of the SDGs combined.

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So putting them all into the practice you can see, design and technology missions with goals; goal-based governance and financial organization; social activism to alter altitude and conduct, attitude and conduct; international relations and diplomacy and offer partnership, financing and peace essential for all of them to work smoothly; plan for action for science; ability be to create transformations; time-based standards; participant involvement and co-design is one of the aspects where the user himself and herself becomes part of the system to design what kind of system they want.

So instead of coming finding solutions from elsewhere and implementing in here, you can involve your own users and communities in devising the solution. This is the most efficient way and one of the design techniques, we call it frugal design, where no participant himself and herself is a part of the design process and that is where you can optimize and improve the efficiency of your design. Lastly, policy monitoring, assessment, and tracking.

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So with this, we have come to this module. So thank you all for joining. See you next time.