Strategies for Sustainable Design
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Lecture 21 & 22
Environmental Impact Assessment

Hello everyone. So, now we will discuss about Environmental Impact Assessment.

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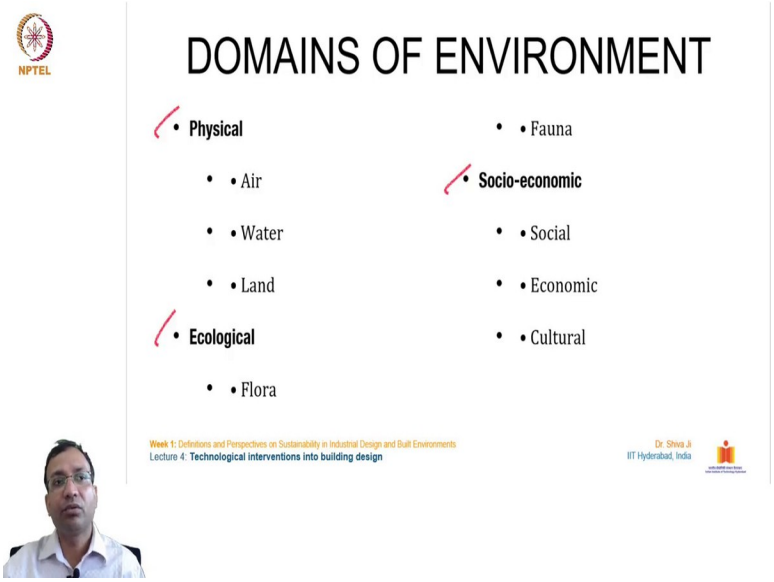

So, there are if you see there are several domains in the environment in the overall sustainability if we see. So, there are those are physical domains in the environment those are ecological domains those are socio economic domains and they have sub domains inside air, water and water, Earth etc. Then we have flora fauna other species and life forms etc. Then we have socio economic the domains inside that we have social economic and cultural sub domains.

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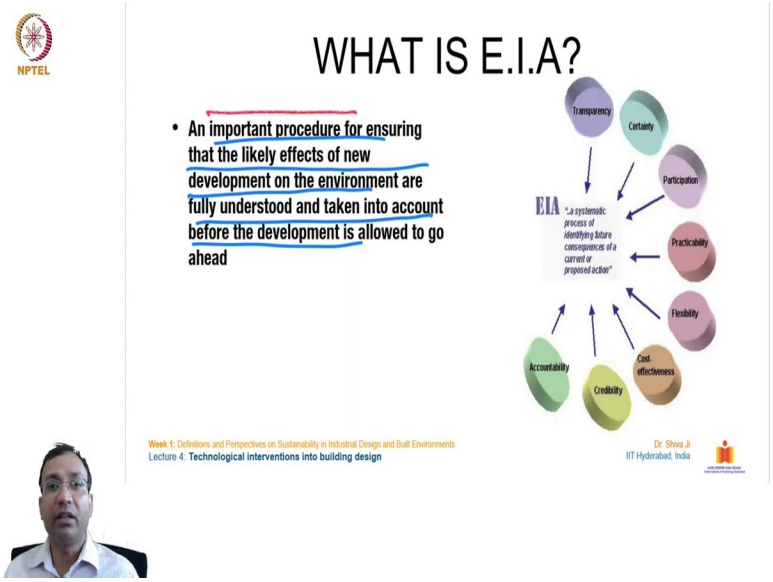

So, an what is the job of the EIA, why do we need the EIA environmental assessment. So, an important, this is EIA is an important procedure for ensuring that the likely effects of new development on the environment are fully understood and taken into account before development is allowed to go ahead. So, it is pre emptive measure, which takes care of calculations and analysis of any proper possible plausible effect.

Which and our development process in a development activity is going to exert impact on the surrounding an overall ecosystem. So, it takes care of with the help of pre emptive measures and calculations. So, it is systematic process of identifying a future consequence of a current or proposed action. So, that is what it does, and that is the main objective of conducting EIA.

So, it takes care of, it results into setting of accountability, it establishes credibility, it checks cost effectiveness, it proposes flexible ways to do things, it checks the practicality it checks participation, it involves people and different stakeholders, it talks about certainty and then the other stuff which are going to uncertainly happen and all that, it talks about in the finite terms, it establishes or will go or transparent system of establishment.

How if we are going to undertake any development procedure any later developmental activity. So, what are the plausible reactions are the repercussions which that place is going to fact, face. So, this EIA conducts this analysis pre handless analysis to understand all of those things, and it helps in taking up an informed decision.

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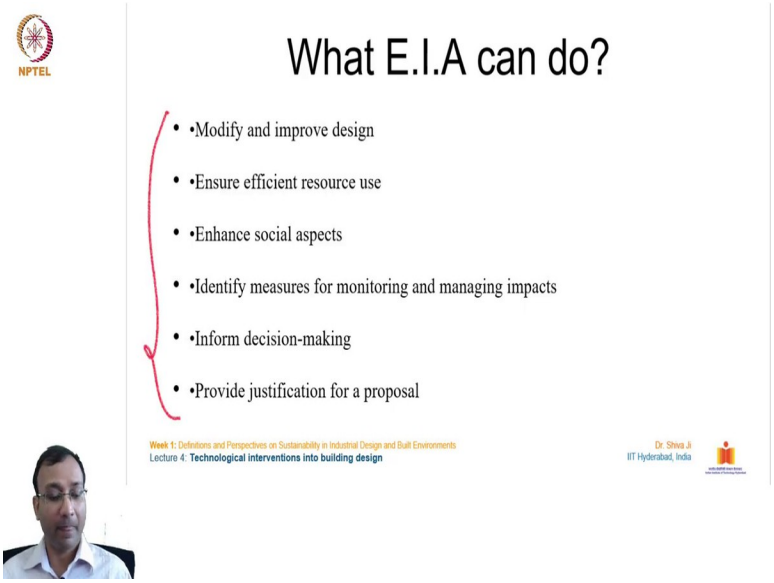

So, what an EIA can do? What is the environmental impact assessments can do? So, they are helpful in modifying and improving to plan and the design of that the developmental activity, what we are going to undertake, it helps in ensuring efficient resource uses. So, it improves it improves usefulness, it improves the efficiency of the resources, resource consumption, it enhances social aspects which take it takes care of the society.

It takes care of the local community and the people and how this development activity is going to affect them in several ways. It helps further in identifying measures for monitoring and managing the impacts. So, it helps in understanding editing data, it helps in drawing you know, a numbers in numbers you can understand, how bad or how good is going to be and what are the different kind of impacts a plausible impacts in the several or different domains what were discussed in the previous slide.

It helps in taking informed decisions, because once we are aware of this kind of effects are going to happen once the development process undertakes, then we can take some further pre emptive

measures to minimize those impacts. For example, if there is a possibility that a certain kind of migration maybe needed something relocation will be necessary for setting up some developmental activity, then the rehabilitation processes can be taken care of to handle such situation and they will lose people to establish somewhere else.

So, these are the informed decision-making things which can be taken care of with the help of EIA. The next comes providing liquidity justification for a proposal. So, if there is any, a developmental activity which is proposed, so, we can have some justification in terms of, what are tentative advantages and disadvantages, the place is going to face.

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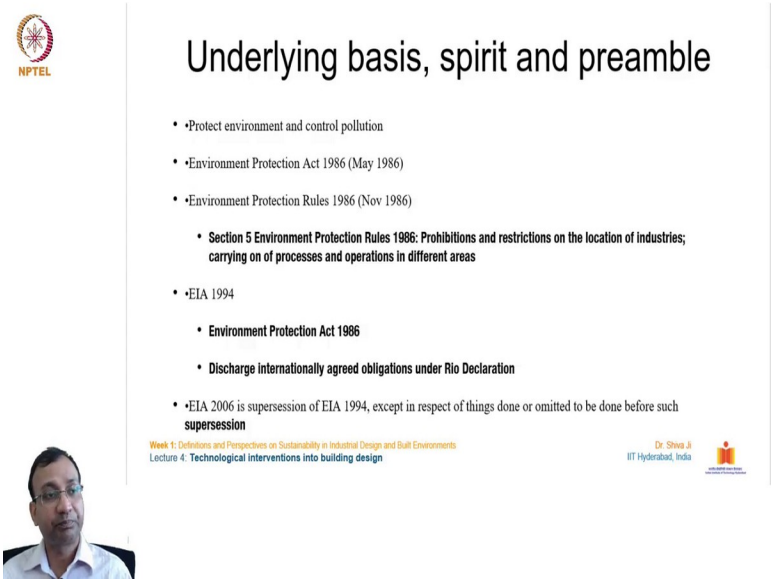

Next, if you see, it is evolving over period of time there are some, if you see some guidelines, some rules and regulations in place, there are some acts established by the Honorable Parliament of India. So, in that one if you see there are environmental protection and control, pollution control rules and regulations are there are there are some several bodies also CPCB, Central Pollution Control Board.

There is NGT, National Green Tribunal. So, these are similarly these are the several institutional, there are these are several constitutional bodies organizations which take care of such assessments, which take care of if there is something goes wrong with the as a result of some

development, developmental activity in any part of the India. So, they come for the rescue of that place they provide legal solutions.

They provide with the corrective measures to cope up with the repercussions which are have happened due to such a bad developmental activities. So, you can see there is this Environmental Protection Act 1986. There is another set of rules, environmental protection rules from 1986 and there is section 5 which talks about normal protection rules, 1986. Prohibitions and restrictions on the location of industries carrying on off legal processes and operations in different areas.

And there is n environmental assessment, in 1994 this talks about discharge, internationally agreed obligations under declaration. So, there are several international declarations also, which our country as a responsible country has kept on agreeing to and it complies with those actual rules and regulations and mandatory requirements, which needs these protocols and these declarations offer for the countries to adopt.

So, these, as we are all aware of all of these rules, regulations and declarations, they work in the betterment of improving the atmosphere by improving the ecological balance of this planet, not just one country, including the entire planet, it helps in developing sustainable models. So, India also follows those declaration and has instituted several rules and regulation in complies with those preambles.

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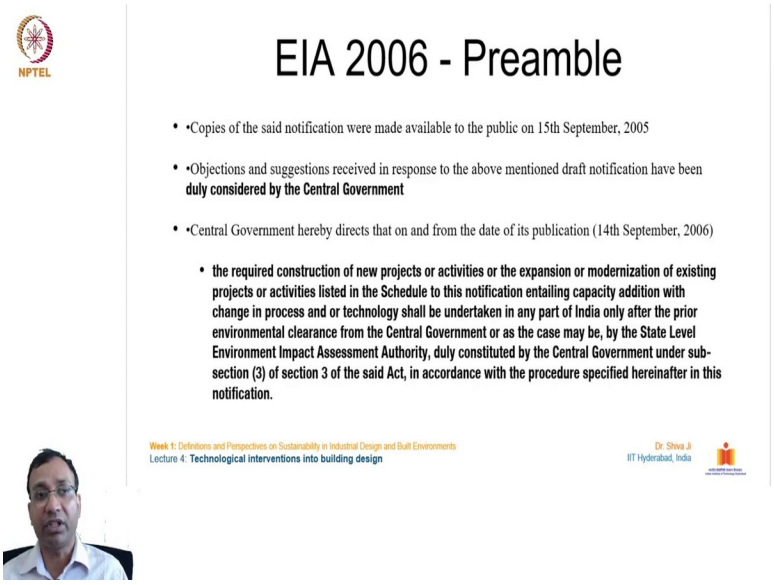

So, if you see EIA, 2006 preamble, what it says the copies of the sent notification were made available to the public conflict in September 2005. So, and standard practice in this is sort of activities is to involve stakeholders, and the major stakeholder in any of such environmental activities is the public itself. Because it is all like of these developmental activities are for the per public, and is for their benefit.

And it is also supported by largely from the taxpayers, money from the public money. So, in a way or any developmental activity is the responsible and is answerable to the public. So public must actually preview such environmental assessment or our assessments, and they must approve of before going ahead with their developmental activities. So, as a honor to that philosophy, this preamble was made available for the viewing from the public on 15 September 2005.

So, an objection and suggestions received in response to the I ever mentioned, draft notification. So, there were duly considered by the central government and a several, editing and corrections were carried out. For central government body hereby directs that on and from the date of it is publication that is 14th of September 2006.

The required construction of new projects or activities, or the expansion or modernization of existing projects or activities listed in the schedule to this notification entailing capacity addition, with change in process or end or technology shall be undertaken in any part of India only after the prior environmental clearance from the central government, or as the case may be, by the state level environmental impact assessment authority, duly constituted by the central government under subsection 3 of section 3 of the said act.

In accordance with the procedure specified here and after in these notifications. So, it clearly states over here this preamble clearly makes it is a point over here any developmental activity which is proposed in any corner of India in any state of India has to go undergo through this clearance of this environmental assessment authority and get their approval only after obtaining that approval they can go ahead with the execution of that proposal. And if need be, there may be some corrections and editing needed, which must be carried out before going hard with the development that activity.

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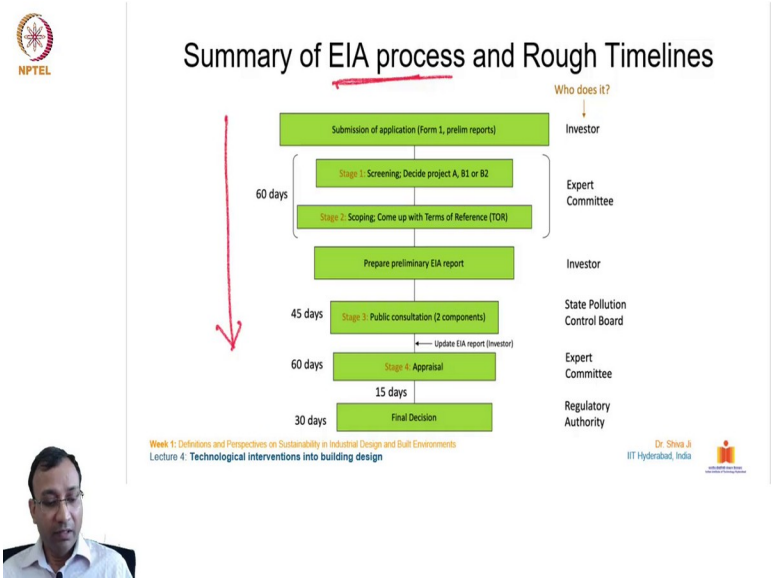

So, if you see summary of this EIA process and roughly, roughly like the timelines if you see, so, it starts from the submission of application which is form number 1 and it is submitted along with the preliminary reports such as some assessment some surveying and some data collection and etc. And then it goes further screening as a stage 1. So, it decides, based on the project in different categories, and then I checked the scoping income, it comes up with the letter terms of reference TOR and then it goes for the preparing preliminary EIA report.

And after that a preliminary EIA report it goes further consultation from different stakeholders, public being the major stakeholder and a different other researchers, NGOs and several other independent environmental protection agencies, etc. And after consultation with the CPCB or State Pollution Control Boards, after consulting with the expert committees, then it goes for the appraisal if there are any corrections needed. That corrections are advised to be carried out further the revised proposal was for the final decision and here and after they go ahead with the their approval.

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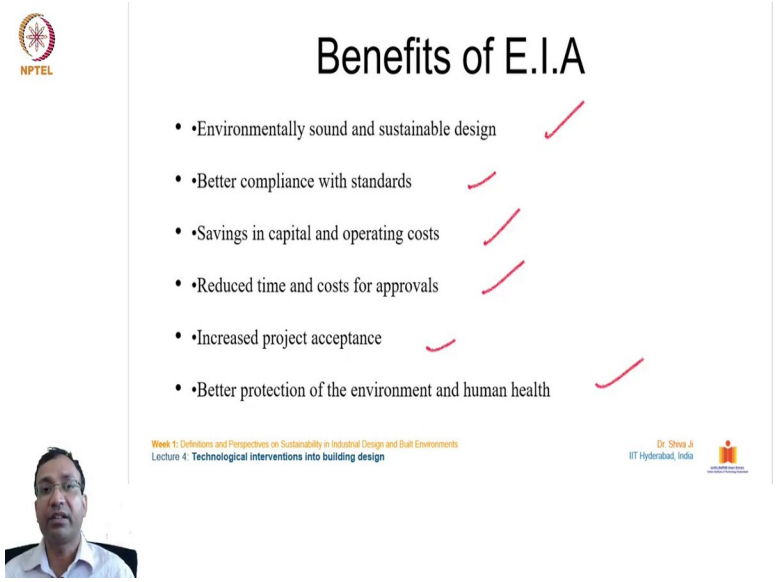

So, what are the key benefits of EIA? So, it helps in establishing sound and sustainable environmental system, it helps in complying with the rules, laws and standards which are given by various agencies. It helps in saving the resource capital, its it helps in saving the natural resource capital of this planet and on the operating costs. It helps in reducing time and cost for the approval, because it is the one centralized body for undertaking any such approval activities.

It actually increases the project acceptance, because once it has gone through the rigorous process of this EIA evaluation from the authority, one can feel satisfied this project once approved, can be not that bad and can be taken as a accepted level of, acceptance in the society and the community and it offers better protection of the environment and the human health. So, this is the overall objective of establishing design environmental impact assessments. So, that sustainable model of growth and development can be practiced in our later real life.

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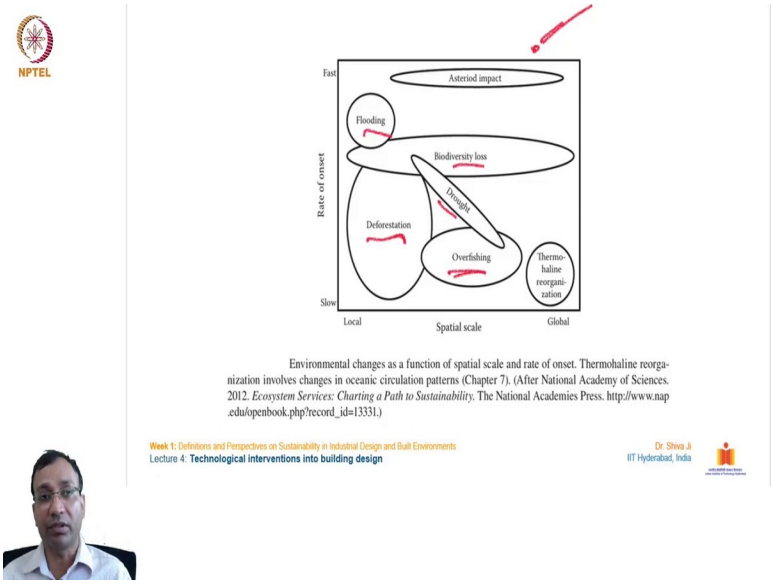

So, in an overall sense, if you see what could cause the damage to our planet, so, on the Xs X dimension, if you see it, so, on the spatial scale, whether it is local or global, or on the Y scale on the Y dimension, if you see it is the rate of the onset, at the rate of which it how fast it can impact. So, from slow to fast. So, for example, a weird example has asteroid impact is given at the top of it.

So, this has potential to work from local to the global level and it could if it falls at any unfortunate day, God forbid, it can cause extensive damage and it can happen at a very fast rate. So, compared to that scale, if we see the other not so noticeable impacts also if you see which we are we do not see unless we experience it on our own, we do not generally take care of these impacts such as flooding, such as deforestation, overfishing.

You know, such as the loss of the biodiversity, components of the several species. So, these are also such indicators, which are happening around us, which are destroying the planet bit by bit every day, every year every decade and the ecological balance of earth the bio capacity of Earth is in a serious compromising situation right now, and how it can be bring back to its normalcy. So, this is the actual purpose of putting up this figure over here. Either methods such as economic system at the method such as EIA, they are there they are framed for developing a sustainable model of growth and development and we must comply to those.

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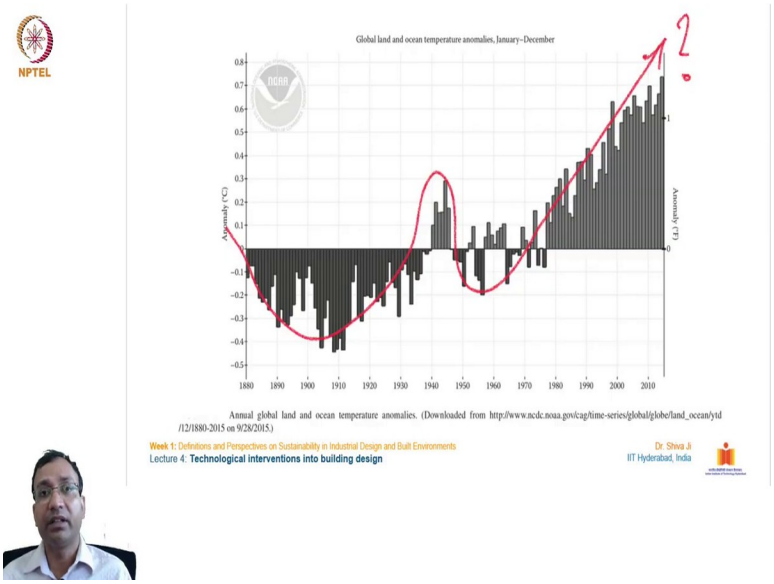

Well, such charts we have seen n number of times how the annual temperature, how the overall global warming is increasing on a yearly basis.

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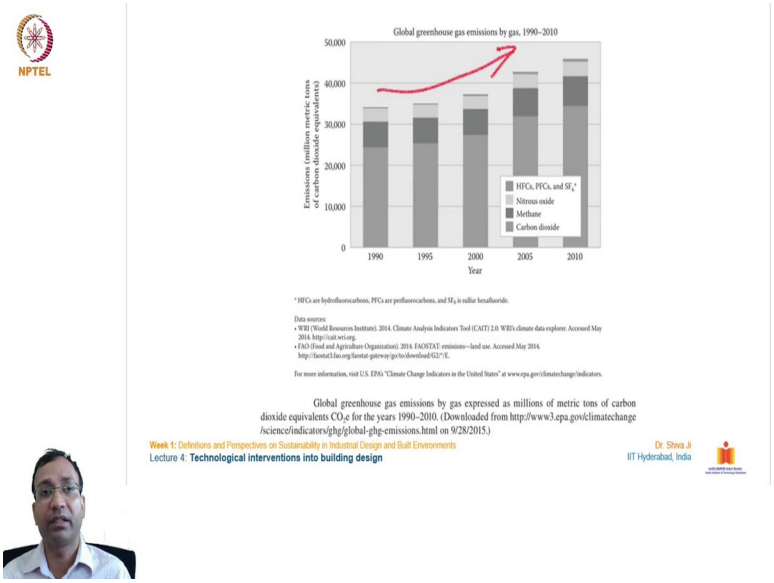

Well, it is increasing only. So, it is a major matter of concern and how greenhouse gas emissions are taking place that is also a major a concern which is causing factors for such after effects such as overall temperature increase and global warming etc.

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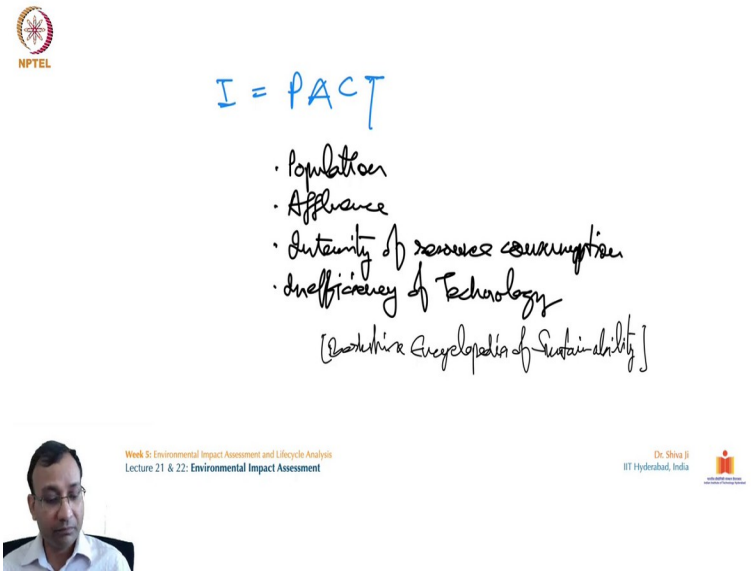

So, these are a model of, how to calculate impact. So, with this, the analogy of this word itself, the researchers they have given this concept I is equal to PACT. So, I is the impact, P is the population multiplied by affluence multiplied by intensity of resource consumption, and that is again multiplied by inefficiency of the technology. So, impact equals to multiplication of all of these put together.

So, that is analogy the researcher has spoken about here and they have spoken about dematerialization also. What it dematerialization? So, going ahead with the reduction in the conjunction. Going ahead with the multiple uses of the resources if it, if you have to use that resource then you go for multiple usage of it, if you have to go for the usage of that resources, then you go further minimal energy consuming a process or the way for utilizing it or consuming it. So, this is a concept of, the process of dematerialization, which could be helpful in reducing this overall impact on this planet.

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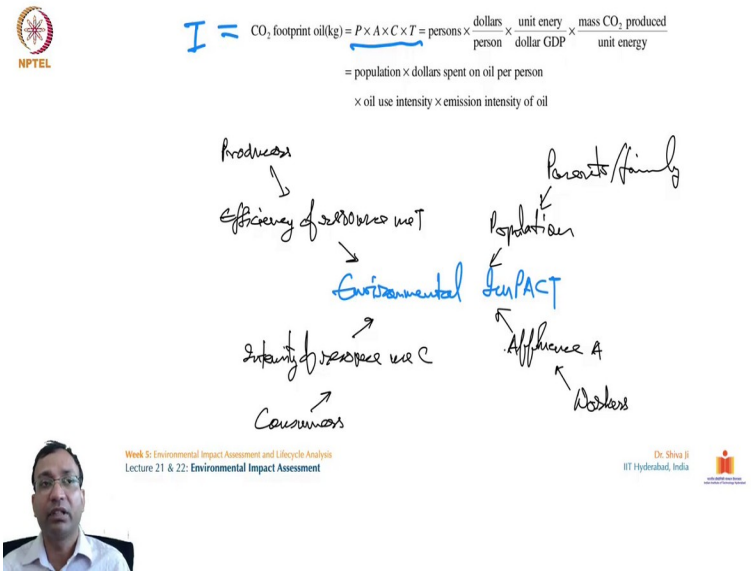

Yeah, so, this is an illustrative diagram of this impact figure over here. And here in this table, you can see, how the comparison of resource consumption levels for groups with low average and high ecological footprints have taken place over the time.

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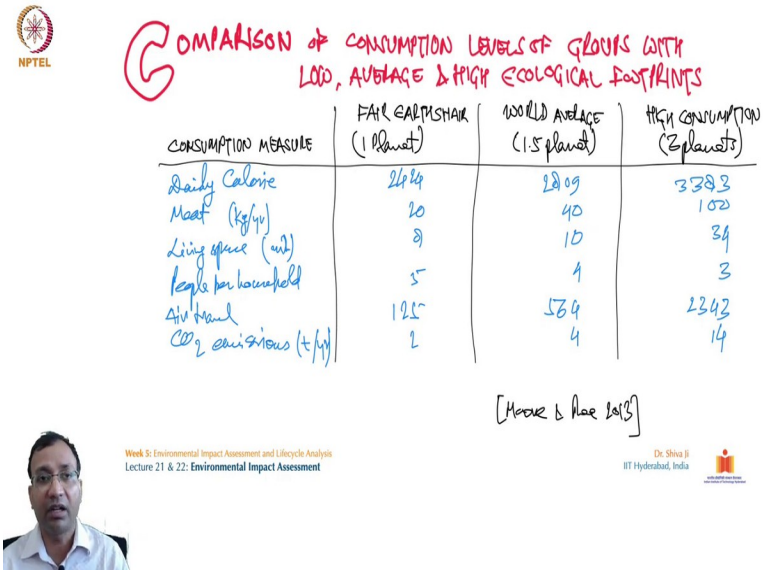

So, the first columns are just about conjunction measures, that is daily calorie supply. Then meat consumption in kg per year. Living space requirement and per square meter and then the people

per household number of people, okay and then home energy used, then motor vehicle travel kilometers per year, then air travels, then CO2 emission a ton per year.

So, in this one if you see that the fair or share power combination talks about consuming just the resources which can be supplied by one Earth unit, are the actually figures given over here for example, daily calorie supply, so, the fair Earth share factor wise if we go So, this is 2424 calories per day and if we go for the world average, which is happening right now, so, we have already exceeded the bio capacity of this planet and we are standing right now at the requirement of 1.5 planet 1.5 Earths and then the high consumption rate we require 3 planets.

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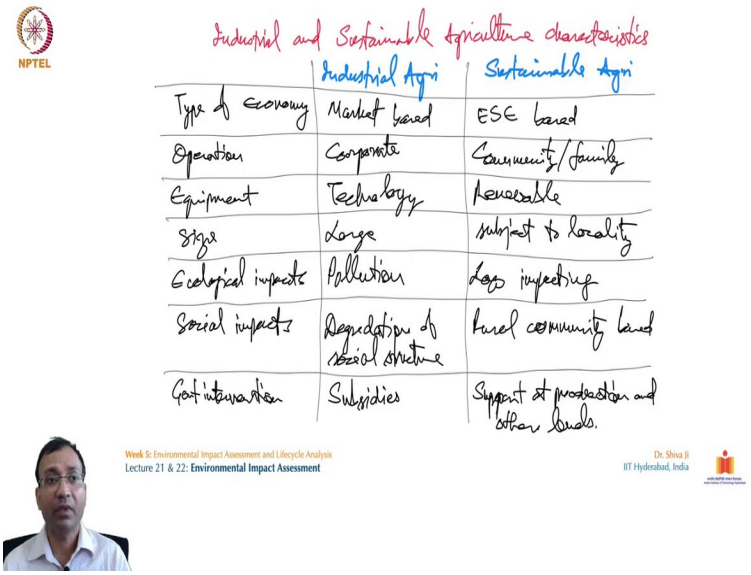

So, this is indicated chart which talks about the consumption rate at which it has grown over the years. So, on this slide are related to the previous one. It talks about characteristics of industrial and sustainable agriculture. So, what are those factors are what are those traits which we can associate from our industrial agricultural system and a sustainable agricultural systems, so, well till now, this in the post industrial era.

So, this industrialized way of agriculture has taken place and a lot of land a lot of barren land a lot of other forms of land they have been converted for crop cycles, they have been, used with heavy amount of fertilizers for the increased yield and several other in the for the cattles to in to

boost their output for meat, milk and meat etc. They have been given with several hazardous medicinal booster shots etc.

To increase the overall amount of their our products. So, these are all the industrial ways of agricultural system. And what sustainability suggests is the sustainable agricultural practices. So, we will see over here what are those distinction points. So, on the type of economy if you see the industrial agriculture talks about a market based focused on national and international markets.

So, the market and benefits and creating economic wealth is the major criteria, but on the other hand in the sustainable agricultural system, the economically and ecologically efficient system, which is oriented mostly on the local and regional markets socially responsible ecologically friendly.

So, these are the two key words associated with the sustainable agricultural systems. So, evidently it talks about a responsible way of using this agricultural practices in a responsible way of consuming a land for such things it talks about and on the type of operation if you see there is this operations are taken care of by management companies, corporate structure and on the other hand on the sustainable agricultural system.

It promotes an independent family oriented or community-based participation, where the social aspects the social value systems are also taken care of, not just the monetary part. On the third criteria, if you see the size of the operation. So, usually industrial agricultural happens at the very large scale generally 508 tiers or even more, and on the other hand, sustainable agriculture takes place on a on a smaller level individual farmers households based on their own individual capacity, they go for these are the sizes of these operations take place.

On the inputs front if you see compared to what are the comparisons, so, in the industrial agricultural system, high levels of industrial inputs, biocides and nutrients in large quantities, fertilizer. So, these are things you know, kind of stuff are given in the industrial agriculture. On the other hand, in the second one a few are new industrial inputs are only the natural inputs ecologically and integrated pest management or given which are very, very rooted to that place.

There may be several types of conventional knowledge is utilized in a handling agriculture at the local level. So, that is the philosophy which goes along with the culture of that place into the

practice of the agriculture also. On the next front, if you see on the ecological of impacts, so, the major source of surface water pollution, it becomes major source for groundwater contamination also because, there is a huge amount of, pesticides, insecticides and even fertilizers are utilized.

So, they ended up poisoning our ecological balance of the water and the top layer of the soil. They ended up eliminating the habitat of the smaller micronesia, micronesia, micro-organisms and smaller small scale microbes and other insects, which are usually live in the later agricultural farms. On the other hand, if you see this agriculture, sustainable agricultural system, it promotes low impact and it uses to the diversity of production including greens, fruits, vegetables, herbs.

So, it uses it grows variety of agricultural produce not just the one, not just it promotes their cash crop only it promotes other forms of crops also to have a balance in terms of nutrients also, because we are all aware of how the legumes help in adding nitrogen to the top soil. And how the other crops such as rice paddy and these things are in a beat, they consume large amount of nutrients from the soil.

So, having are a circle of different crop cycles, different actually grains and cereals, fruits and vegetables, it helps maintaining the nutritional value in the topsoil. So, sustainable agriculture promotes such practices. And on the next front, if you see on the government intervention, there are a lot of subsidies and incentives available for industrial scale agricultural production. And on the sustainable agricultural system.

If you see government's support for the production of non market goods, it is supposed to services you know, ecological and social elimination of unsustainable input and production of subsidies. So, it the government helps in both the entities and in the recent years, governments our intervention has increased, the government support system has increased in to support a small scale, farming activities and farmers.

The last round talks about social, what are the social impacts? So, for these 2 types these 2 types of agricultural practices. So, here we see the first one depopulate rural communities, which leads to degradation of social infrastructure, the closure of schools collapse of the housing market. So, we have seen some such impacts of n industrial level agricultural practices because they employ

a wide variety of motorized and automatic systems in turn, they employ little local labor force, man force to work on these farms and these places.

So, in turn, they ended up kind of a forced migration kind of phenomena, causing the people causing the local people to vacate these places and move away to the other greener areas. So, these are some of the after effects of after effects into social area for the, industrial agriculture. On the other hand, if we see, how the Sustainable Agriculture supports such activities, so, which is beautiful to have a decentralized model of our economic growth and development processes.

So, it helps servicing local market, it provides stability to the rural communities and societies. It provides economic diversification maintains cultural and landscape values, regional identity and traditions also. So, we see there is a there are n number of value systems which are also, sustained and encouraged by sustainable agricultural system.

So, this is beneficial in multiple ways it helps in the local market, it helps grow the diversity of the product because the industrial agriculture mainly focuses on the cash crops or the crops which are necessary for the market or which are in a huge demand, they do not necessarily will be taking care of supplying all sorts of goods, they may not be taking care of maintaining the ecological balance or they are maintaining the nutritional value in the soil.

They may be using booster, fertilizers and other supplements for the high yield of the crop, but a sustainable agriculture promotes the local knowledge, it promotes the local vernacular practices of the place and that is why it is beneficial for the places.

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So, what are the tools and techniques for if you see or, if you want to have an n assessment have an impact, environmental impact assessment in different scenarios. So, if you see this particular illustration over here, it talks about tools and techniques for integrated design with a overview. So, there are several types of assessment methods and analysis systems which are given over here in X, Y, Z dimensions.

So, on the X dimension, if you see it talks about the product life cycle, so, on that front, it has scales of fabrication scale of assembly uses at the end of the life that is retirement or the disposal period. On the Y dimension, if you see it talks about analysis and improvement, you know, so, it talks about majorly decision-making capacity. The dimension of our part of this thing on the jet if you see it talks about design process.

So, what are the problem specification? What is the conceptual design? What is our embodiment design? What is design detailing? And what is the evaluation etc. So, at these, X, Y, Z coordinates the methods such as DFD design for disassembly and DFS design for serviceability, DFR design for the recovery, DFA that is designed for assembly, DFM design for manufacturing, QFD quality function, deployment, LCA that is lifecycle assessment, SLC that is streamlined LCA and LCC that is lifecycle cost analysis.

So, these are the different assessment methods and different approaches for evaluation and even planning these are these are placed to suit which suit these particular combinations. So, this gives us a comprehensive idea which kind of tool or which kind of approach would not be working more suitably in which kind of scenario. So, this is very, very beneficial for our understanding. So, we as a designer and architect and engineers can apply these tools in the appropriate situations.

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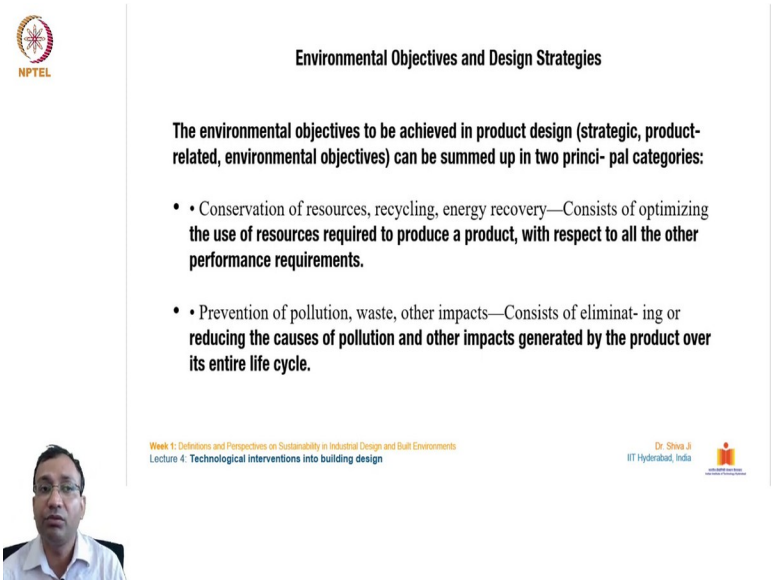

So, lastly, what are the environmental objectives and design strategies I would to talk about over here is the environmental objectives to be achieved in the product design with the strategy and product related or environmental objective concerns can be summed up into 2 principal categories over here the first being, conservation of resources, recycling, energy resource recovery.

Consist of optimizing the use of resources you know, required to produce or render the service of that product. So, these are philosophies we apply for conservation for the purposes and on the prevention part prevention of the pollution, prevention of the waste, prevention of other the other forms of the impact, we must work with the consistent eliminating or reducing the causes of the pollution and other impact generated by the product or the its entire lifecycle. So, these are the 2 major objectives we see over here for the conservation and for the prevention, and accordingly

actually, we can choose the appropriate action points. So, this is for now. So, thank you, everyone.