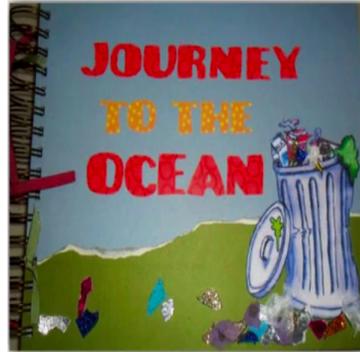


Strategies for Sustainable Design
Professor Dr Shiva Ji
Indian Institute of Technology Hyderabad
Lecture 43
Summary

(Refer Slide Time: 0:16)



Spread the awareness



Learning resource to facilitate EFS for children under 5 years of age

Week 1: Definitions and Perspectives on Sustainability in Industrial Design and Built Environments
Lecture 4: Technological Interventions into building design
Course: Strategies for Sustainable Design

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Hello everyone, in this lecture we will try to summarize the whole course strategies for sustainable design. So let us begin. So, the first and foremost if you see around the subject of sustainability the major lacking actually area is the awareness. How to inform like a general public, how to inform everyone, so that they can behave responsibly, because there is a huge gap of actually information and knowledge regarding the subject of sustainability and how it can be implemented and without actually people's participation.

The environmental concerns, the social concerns and the economic concerns around the sustainability. So, the first and foremost importance is to spread the awareness. So, if you see like at this slide so starting from like a children's like a schooling system from there itself if we start spreading this awareness because once they will grow up you know they will be having, they will be carrying actually this knowledge you know with them and they will actually most likely they will perform actually as per the protocols, as per the actually expectations you know which will eventually will help us rebuild us like the fragile ecosystem.

So, the first and foremost is if you see like a this it is actually a drawing by a student you know who has actually drawn if you see like how the journey you know offer like these are discarded materials the packaging the products you know the other things you know start from the household and till the last wherever they reach they go to a like a landfill, they go to a lake, a river eventually reaching to the like ocean floors and during this time causing like a different kind of like issues problems and in the even that like in the oceans causing disturbance to the marine life.

So, how this actually information at least this kid is now aware of this situation. So, at least for like before discarding any like this packaging materials and things at least he or she will think it again like how to responsibly disposed actually that particular item. So, this awareness actually is a very important actually factor in spreading this word.

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Involve new generation



Sustainable project model year 6

Features of this home included recycled timber and recycled steel for the roof. Roof lights and ventilation, a veranda for shade, water tanks, solar panels, composting toilets, vegetable garden, fruit trees, compost bin, poultry and a wind turbine

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Further, if you see like a giving student like a such projects are in for such information and like a knowledge-based projects and assignment where they can understand those you know the symbol the concepts of like a sustainability in a like a simpler way. If you see like this project right here on this slide, so the idea on around this project is to use the discarded materials to construct this house.

So, if you see like they have used this recycled actually pieces of like you know wood recycled like a steel you know metal sheets you know even like a using like these are windmills even like

a involving like if you see like a veranda for like a shading over here you know and water tanks you see over here you know solar panels on the roof you know you see here and here right and then composting toilets are actually you know there is given you know this idea of like this vegetable garden, kitchen garden is actually given you know fruit trees you know composting like a bins you know poultry and a wind turbine.

So, all of this you know they are not just a piece of like a model or like any like a you know worthless exercise, but this is going to create actually an impression you know on that child like a brain for like a longer period of time. So, at least he or she will get exposed to this like the concepts like how a house should be built you know.

In what ways it can be built, in what ways it can be designed you know how to use the materials you know how to go for like such concepts. So, if we are actually studying in us like these classes about these concepts but for actually if we introduce this concept to like a children's at an early age you know they will not actually take much longer to understand and you know and like find it like a you know is useful in their lives.

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Involve new generation



Alternative energy source working models including a wind generator, a solar panel, and a water turbine



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Further in the next like a slide if you see over here, again like an example for like a is given for like a harvesting like a energy from like a solar and wind panels you know and other things like you see over here like a water turbine over here. So, how they can actually utilize this actually a wealth of knowledge is very actually an interesting and a curiosity based actually exercise. So, we should actually introduce as like educators as like our designers you know to like early you know education system how they can actually make use of our such stuff even like exposure to the like harvesting a solar energy in different way.

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Involve new generation



Solar oven. The cooking of savory rice



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For example, if you see over here this cooking actually a system is given which utilizes a solar actually you know light to prepare the dishes.

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Involve new generation



Students testing the temperature and pH of water



Children building a model in the sandpit illustrating precipitation and runoff in the local water catchment



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Further if you say like students are exposed to like a other scientific activities such as like a checking the ph of water, so whether a certain ph of water indicates what you know so at least they will carry on this information with them you know second in this second model if you see like a model in the sandpit illustrating precipitation and runoff in the like a local water catchment. So, how actually water behaves once the rainfall actually occurs in any given actually

location and depending upon the topography. So, if we give them this actually a piece of information, they will carry it with them right.

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Involve new generation

A student's window as seen and drawn by her



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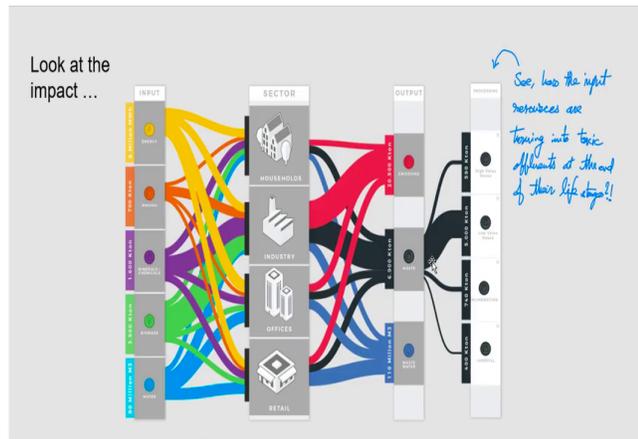
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So, how these actually scientific knowledge and things can be made actually easily understandable you know so the awareness has actually a huge impact you know so we must actually work for creating this awareness. This is actually a sketch by a student you know what she has seen from her window, so if you see like she has drawn a variety of like a thing you know the houses and the people you know the trees you know and then the skies and other stuff.

So, how their observations you know like a actually occur, how their observations actually take place, what do they observe you know what do they actually you know understand from this observations you know it is very interesting actually phenomena if we like a go through the child's psychology you know.

So, it is always better to deal with the children in a very soft manner you know to introduce actually such concepts of sustainability. So, I believe extending this knowledge to the children will be an important actually you know result in the like times to come.

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Further coming back to the us like a main like a concept you know so how this the impact has actually taken place over the time. So, we have seen actually these slides in the earlier lectures, we give a number of like inputs for like an energy you know material you know we give like a minerals and chemicals, biomass water and like all other kind of like a stuff for like our utility.

Utility in like a household, utility in like industry you know offices, retail you know and in terms of like a output what do we get? The emissions you know the waste you know and the waste other like a natural material such as like a polluted air, polluted water, you know. So, it takes like a huge actually amount of like a resource's huge quantum of resources and a bad impact. So, how this actually can be closed, how this can be actually dealt with is the exercise for us today to address.

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Urgent change in behavior needed ...

Now, is the time to make decision of what is good for nature and humanity and what is not?

Good

Good For You, Good For The Planet



Do you eat for your health or environmental sustainability? You can do both, says The Double Pyramid!

HealthyWorldin

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Well there are smaller things what we can do you know, the urgent change is needed in our like a behavior and how do we consume stuff you know starting with our like a food material to the like a other like a gadgets and products and a utility area like a products which we use. For example, like a upholstery, furniture anything and everything you look around your place you will see like a all of these products you know they are manufactured somewhere you know they have utilized certain like a resources they have used some amount of like energy you know.

So, with like a you know submission of all of these products combined for the like a whole world you know it results into the huge actually consumption of resources and energy. So, how like a change at a unit level can break can bring a big change in the overall scale is actually a matter of understanding over here.

So, this is what I want to bring for our like a understanding, we must actually change our behavior you know we must not actually fall prey to this consumeristic actually lifestyle but we should actually introspect and go for level much simpler solutions which nature has provided for our like a day-to-day living.

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Urgent change in behavior needed ...



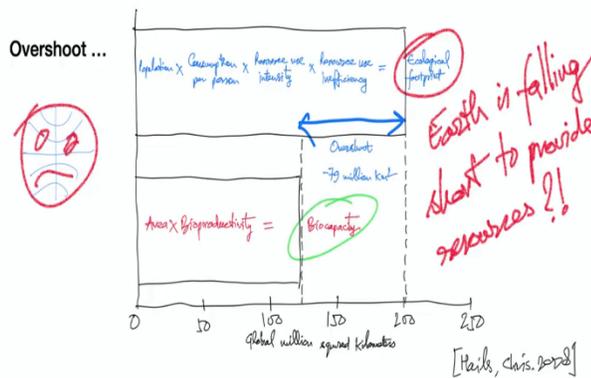
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Well, in what ways this can be done you know to control our like a buying pattern you know. So, use what you have you know so I will again reiterate we must actually make use of whatever is available with us, only if it is like a not available with us and we cannot actually manage then we can go for actually borrowing from somebody you know we can get it now on like a you know maybe rent if you need like a something you know or maybe we can swap it from somebody maybe we can go for thrifting you know or maybe we can go for making ourselves you know.

If not at all possible then only we should go for the buying because buying induces you know a big chain in the economy. Well from the economy actually perspective, buying is a very important factor but buying responsibly is the need of the hour and that actually caters to the sustainable actually you know growth and development model.

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Week 12: SD Case Studies and Summary
Lecture 60: Summary
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Buying you know mindlessly is not going to lead us anywhere rather it will lead us to a bigger trap you know which is like we have already seen with the you know lack of like how the how the earth, how the humanity you know and overalls had already like a overshoot, you know the bio capacity to see this slide you know. So, this is only because of this mindless consumerism you know and the like a consumption pattern.

So, we must actually control it otherwise earth has already actually fallen short of meeting our requirements and further with the number of populations increasing the number of requirements increasing it is going to you know this gap is going to widen even more you know and that will lead to a severe actually crisis situation for a huge number of like a people from across the world.

The people from like a impoverished countries you know, people from like a weaker economic actually countries you know they are going to suffer, they will be at the receiving end. So, we must actually take the all humanity along and we should actually bring our like a consumeristic lifestyle and patterns and the whole volume of this consumeristic actually requirements under the capacity of this biocapacity, so that the equilibrium remains there.

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Main environmental issues

- **Global warming:** Global warming describes the process by which greenhouse gases accumulate in the atmosphere in abnormally high amounts, trapping the Earth's radiation and causing its temperature to rise significantly. This is linked to environmental problems such as changes in rainfall patterns, rising sea levels and expansion of deserts.
- **Pollution:** Pollution of air, water and land, resulting from burning of fossil fuels, industrial processes, agriculture, and other human activities, is endangering human health, biodiversity and the built environment.
- **Ozone depletion:** Ozone shields the Earth from ultraviolet (UV) radiation and its depletion is caused by emissions of chlorofluorocarbons (CFCs) and other ozone-depleting substances into the atmosphere. Increases in UV radiation are thought to be linked to a rise in skin cancers, damage to the human immune system, and altered crop yields.
- **Water:** A third of the world population is still without access to safe water and, as the global population grows, the need for water will grow, as will waste and pollution which will increasingly threaten the quality of groundwater and rivers.
- **Resources:** Some non-renewable resources, including natural gas and petroleum resources, will eventually be depleted. The economically viable extraction of some abundant mineral ores may also be limited. Renewable resources, such as timber, are also at risk of over-exploitation.
- **Deforestation:** Deforestation through commercial logging, conversion of forest land to agricultural use, and other activities causes the destruction of natural habitats and extinction of plant and animal species and exacerbates the effects of global warming and pollution.
- **Soil degradation:** Urbanization, construction, mining, war, agriculture and deforestation can cause soil degradation. Soil erosion, increased salinization, altered soil structure, drainage capacity and fertilization can diminish crop yields, increase the risk of flooding and destroy natural habitats.
- **Waste:** Increasing amounts of waste add pressure for more landfill sites, which pollute air, soil and groundwater and for more incineration, which pollutes the air and produces generally toxic residues.
- **Extinction of flora and fauna:** The current mass extinction rates of plant and animal species are the summation of the environmental damage to our planet.
- **Population:** Global population growth is associated with increases in the human-induced environmental impacts mentioned above.



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Well, so in the recent times in the recent decades what are the main environmental issues observed are listed over here of like a global warming, pollution, ozone depletion, water scarcity, resource scarcity, deforestation, soil degradation, waste, extension of like a several species of like a flora and fauna and population.

So, these are the actually major issues you know where there is like a huge concern, so these must be actually addressed independently or with the like a systemic approach you know collectively you know like to address actually these issues.

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EIA

- An important procedure for ensuring that the likely effects of new development on the environment are fully understood and taken into account before the development is allowed to go ahead



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Well how this can be done? So, we have certain solutions we have discussed this in like a power like a prior lectures EIA Environmental Impact Assessment is one of them. It is an important procedure for ensuring that likely effects of new development on the environment are fully understood and taken into account before the development is allowed to take place.

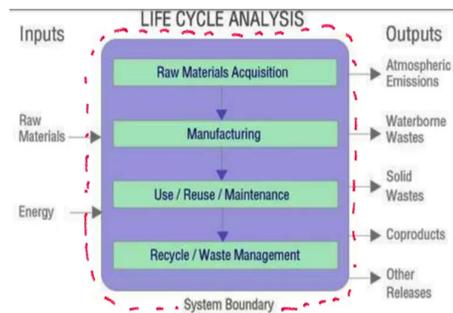
So, this is actually an important actually factor you know this is an important actually consideration and exercise we must undertake before actually taking up any infrastructure project. Well what kind of repercussions, what kind of after effects are going to take place once the project is executed.

So, you must actually calculate it we must actually take like a preventive measure to minimize the impact or rather bring it under the actually threshold you know, so that the overall impact remains like a negligible or it does not actually cross the threshold.

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LCA



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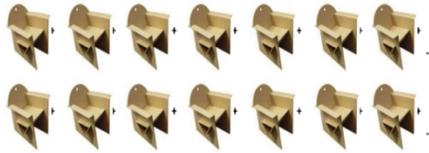
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Further we have a very famous life cycle analysis you know, so this works at the unit level maybe we can calculate our products LCA, maybe we can calculate a LC of a building you know or something like that. So, this also helps in defragmenting a unit actually things of like the life stages of a production starting from like a resourcing office raw material to its manufacturing, transportation you know uses, maintenance and after the life disposal. So, how this can be also corrected you know to minimize the impact.

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Time ...



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Further, we have seen like a how the strategies for like a sustainable design can be utilized in actually improving the scenario of like a design of like a building so design of like a product or any like a designing of even like a service. So, if you see the one important thing from that list, I wanted to bring to you like understanding, like time is one of the important factors we must include in us like a consideration before going for the design.

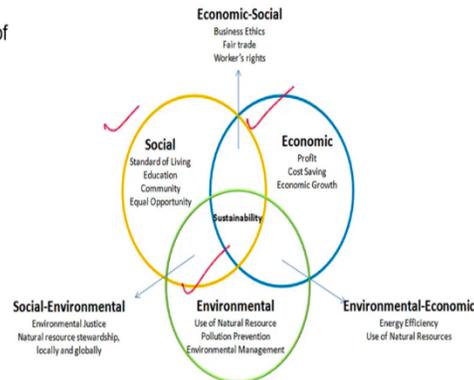
So, as you see like a these two like a products two different products are compared over here you know on the factor of like a time, like a how much like a of a time they are going to serve you know the layer like a you know the requirement which is expected out of them you know and we must actually choose the products you know techniques you know and manufacturing processes to actually extend the longevity, extend actually a serving lifespan of that product, so that the need of like a multiple products in the for the like a same like actually time range of like a requirement we actually can avoid you know.

So, that is the idea over here so you must actually take this consideration also in your like a design exercises, so this is why I wanted to bring.

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ESE aspects of Sustainability



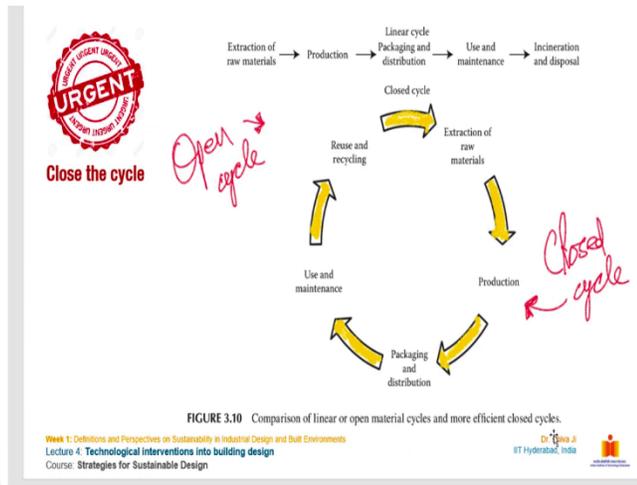
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Well, we have seen like a several times, like a sustainability in today's like a scope consists of like 3 important aspects - environmental, social and economic. So, how the design, how this whole phenomenon of like a growth and development can be moving around this sustainable actually approach is the actually talker, is the actually discussion what we are undertaking right now.

So, how the combination of these two you know results into like a you see like your economic social models, social environmental actually approaches environmental economic approaches. So, with the combination of all these 3, we actually get this sustainability approach.

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In that actually the one another important factor what we have been observing through this study of like our several like a product designs which we have used as a like a case study in this course you know so closing the cycle has resulted into one of the major actually approaches which needs to be actually carried out in today's concern in the today's actually time frame.

So, we must actually close the cycle, because we have discussed resource at the wrong place you know becomes a pollution. So, how we can actually not allow a resource or any material you know to land in the wrong place and become actually a polluting agent you know. So, why we must actually learn and devise ways to close the cycle, so that the at the end of the like a life cycle of any like a product it becomes a raw material for any like a next actually cycle, next like a products like life cycle. So, thus we will be able to close this circle.

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Do we have time?

APPROACHES TO SUSTAINABILITY

- intervening after processes' damages
- intervening on processes
- intervening on products and services
- intervening consumption patterns (SCP)

INCREASING (POTENTIAL) ROLE FOR DESIGN

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Further, how much time do we have and what kind of like interventions are needed at what stage of the you know a product's life cycle, so the biggest actually potential for in intervention you know is at the level of you know intervening consumption actually pattern. The first and foremost thing which I spoke in this today's lecture you know about controlling the consumption, so the biggest intervention, the biggest potential of improvement is possible at that stage only because the moment I decide not to buy a certain thing which is not so necessary for like my uses or my like some utility you know at least I am saving all of the materials resources and energy required to produce that thing.

So, it is as simple as that, so how this can be actually this thought actually can be improved is the actually matter of discussion over here. Next actually a level of like a intervention, next biggest actually intervention is possible at the level of like a products, designing the products and the services. Further actually the potential is at the level of designing the processes and the least potential remains for like a you know improvement is that the like a once the product is like a used or discarded or it is like end of the life cycle stage.

So, we see like a we are talking about you know going for the recycling, we are talking about like a repurposing you know, reusing and all that but these are all the actually stages, where the product has already lived its life you know it and it has already exerted its impact and further it is going to create even more impact rather.

So, all of those things can be taken care of if you attack this whole thing at the beginning only you know, if we attack this whole thing at the like a consumption pattern only like if we just decide not to use certain things you know. So, we will certainly be helping you know in reducing the you know production of that particular like a material or the article.

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Strategies for Sustainable Design

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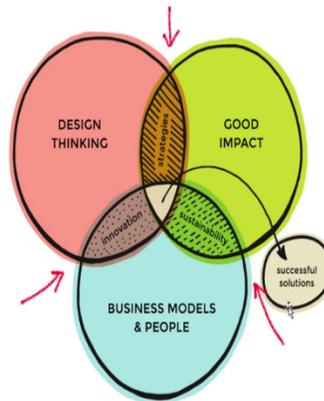
So, what we have been actually studying through this course are about the like a strategy of for like sustainable design. So, these are actually a few listed strategies over here you can actually take note of them again, like a product service system like designing that model you know, designing for like a producer like a steroid ship, designing for dig materialization you know, removing the materials you know, removing the redundant parts you know, components you know, designing for like a remanufacturing, recyclability you know, repairability, reusability you know, disassembly, designing for like a system change, designing for extended lifespan longevity you know, efficiency, designing for modularity you know, designing for like a influence, equity, etc.

So, these are the actually some major strategies which we have studied in this course and like we have seen like a several examples how the designers, architects and engineers have utilized these strategies in designing they're like a building, designing like a product solution, designing for like a service you know. So, we can actually take a help of an actually these strategies for our own design projects as well.

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Solutions ...



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So, the for the solution you know we must actually employ this design thinking, these strategies you know which are under like a cusp of this design thinking and good impact. So, the idea about like how and why we should actually employ those strategies is to have actually the good impact, so that the negative impact can be minimized.

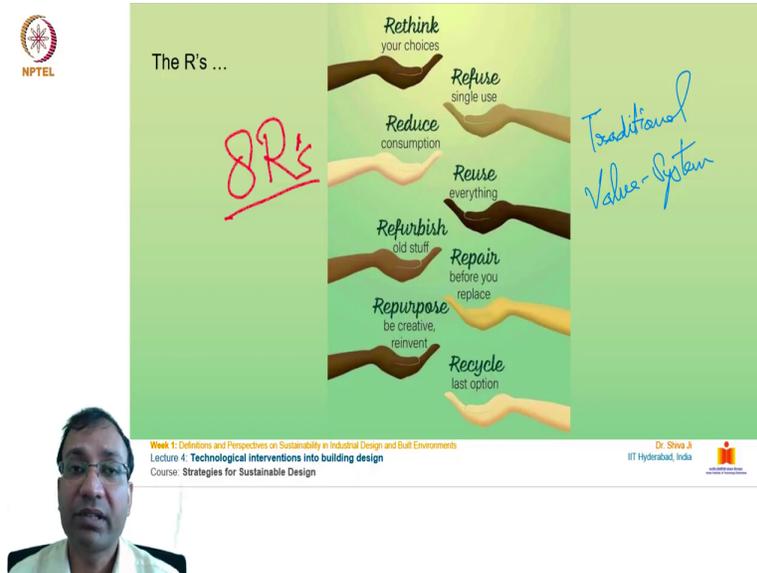
Further we have to improve you know these design thinking like how responsibly how in an empathetic way we can design actually solutions, whether they are from like industrial design courses, whether they are from like architecture you know or in the field or in even like academic projects so from anywhere.

So, this is where actually these strategies fall in place you know and between design thinking to the business model and people, so we can go for actually innovative approaches. So, remember in the lecture of like a innovation we thought like and we discussed like how innovation can take place. So well, innovation and need not actually is restricted to like a educated and qualified people and only you know innovation can actually happen at any place at any given time by anybody.

So, we must actually go for like a such like innovative thinkings to come up with you know out of the box solution you know and thirdly of course we have to satisfy the sustainability. So, at the cusp of these actually these 3 like us the strategies which are like being employed you know the innovative actually out of the box solutions you know and sustainability approaches at the

confluence of these 3 we get the successful solutions. Well, so these successful solutions you know can be utilized for like a reducing the impact.

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And do not forget about the different R's you know, the 8 R's example which we have discussed in this chapter you know about rethinking you know, so we can actually always fix a power like a choice you know to prevent the consumerism you know and then we can refuse you know like a single use product we can go for actually choosing multiple uses product the products who have like a extended lifespan you know or maybe they can be repurposed into different uses right.

Then we can go for reducing the consumption, even if we need something, if we cannot actually fulfill our requirements then if we have to go for like a certain product, we can at least minimize the amount of it, the quantum of it. Rather further like a reusing stuff you know so that we can fulfill our requirements and needs you know by reusing the products which we have bought actually previously or we have it at our home you know and then refurbishing you know I always we can go for refurbishing for like an older furniture's, you know the older like upholstery items you know, several other like the paper based actually products and things you know the fabric based actually products and materials you know.

So, refurbishing is highly possible for like a you know furniture based actually like a material you know like a wood, timber, glass, steel, etc. So, we can always actually refurbish and reuse

them for our requirements, again repairability the electronics and electrical gadgets you know which have actually developed some snag or some malfunction they can always be repaired and so we must not actually go and discard them after like just one malfunction and you buy the new one, that is not a good actually practice.

Again, repurposing you know like a for example, plastic so how we can actually make use of the plastic to repurpose it into further like other purposes also like the example we saw like this, the discarded plastics you know they are being used for the top layer of the like a road. So, how like a this is actually a repurposing, so how the material which is discarded can be repurposed, reused somewhere you know and then finally like a recycling. So, if there is no other option we can always go for the recycling. So, in these actually 8 R's we must actually learn to implement these.

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Traditional living of cultures

- Life forms are existing on this planet for millions of years!
- Humans have lived in cohabitation for thousands and lakhs of years!
- How does cultures thrived for thousands of years without causing damage to the planet?
- They lived in sync with Nature

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Finally, so these are not something like a you know like a new ways solution or like a we are talking about some very difficult signs or something. These actually things have been in us like a you know customs and us like a social actually system, so our like a our families you know our ancestors forefathers you know our parents they have been actually trying to fulfill their like a requirements you know through the means you know which are like a you know sourced locally and then the whatever is available at the household only.

So, they have been doing it they have been actually practicing it. This fast pace actually consumerism has actually picked up in the recent years and a few decades you know with the help of this advertising and some other like enticing actually techniques, where companies actually try to forcibly sell their products you know enticing and giving us actually some like some daydreaming kind of like a you know this feeling that this product is going to bring like this change, that change you know.

So, this mindless actually consumerism has led to this devastating actual situation. So, the traditional actually living cultures if you see the kind of like a value system what they have you know there is nothing wrong in going back and adopting them even with our own like a this modern actually lifestyle, we can still go for like a adopting these values systems from the older times and we can actually learn to live in the sink of like a nature you know we can learn to live in the cohabitation with the different like a species of life on this planet you know.

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The value system ...

NBC - The Light Ahead

- The ancient Indian wisdom gives three attributes of
 1. अपरिग्रह – Aparigraha (minimum possession),
 2. संरक्षण – Conservation (minimum consumption) and
 3. पुनर्चक्रण – Recycling (minimum waste) which seems more relevant today than ever.
- ✓ With these attributes and rich heritage in sustainability and living styles, India can make substantial contribution in planning and design for sustainability.
- ✓ Building in harmony of regional common knowledge resources which are part of every cultural societies.



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So, the guiding factors what we have seen through our like a national building code of India and like a other literatures also the Indian like a ancient scriptures and all, so these 3 things actually are prominently given in them about you know the 3 important attributes of like a *Aparigraha*- that is minimum possession, *Sanrakshan*- that is minimum consumption and *Punarchakran*- like a minimum waste.

So, these are the actually 3 key areas you know key actually value systems which we can adopt and they are still relevant, they will always be relevant you know as far as the sustainability is concerned because these value systems have been a part of this culture, which has thrived on these actually lands for like unknown years of like a time like a thousand and thousands of years of time you know.

So, this is the actually way the us like a forefather have lived for a you know for so long you know. So, in the like a recent time, if we see like an only in the like a post indication era like how like a so much of a disbalance actually suddenly cropped up you know. So, we must actually learn to go back to these routes, with these attributes and rich heritage in sustainability and living styles India can make substantial contribution in planning and design for sustainability. Next building in harmony of regional common knowledge resources which are part of every cultural society.

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Importance of vernacular ...

- According to Foster: "Vernacular architecture can typically be understood to be a region's indigenous local building customs, materiality and the milieu in which it arises. Vernacular architecture is an architectural style that is designed based on local needs, availability of construction materials and reflecting local traditions. At least originally, vernacular architecture did not use formally schooled architects, but relied on the design skills and tradition of local builders".



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Well again, with the cultural societies the mention of vernacular becomes like a imperative. So, like a vernacular architecture is like this indigenous local building like a custom you know the materiality and milieu in which it like arises. Vernacular architecture is an architectural style that is designed based on local needs availability of construction materials and reflecting local traditions. At least originally vernacular architecture did not use formally school architects but relied on the design skills and traditions of local builders.

So, through the vernacular architecture we just do not actually meet our functional requirements, we actually show our own skills also which have developed over like a number of years. So, it shows like how ingenious that actually culture is, that society is that community is. So, with the vernacular architecture we give example all of like a several other things also.

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Biomimicry

shallow/
reductive
biomimicry

mimicking of natural form

mimicking of natural process

mimicking of natural ecosystems

deep/ holistic
biomimicry

Levels of biomimicry

1. form

2. process

3. ecosystem

Subj. Des. 20, 189-199 (2012)

Materials material science	Approach 1	↑ engineering
Mechanics/Dynamics general engineering, locomotion	Approach 2	
Structure structural engineering, architecture	Approach 2	
Form architecture and art	Approach 3	↓ art

Applications in relation to design aspect categories

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Okay and one of those examples is like a biomimicry like how with the help of biomimicry and mimicking the nature we can actually go for sustainable solutions. So, for that you know mimicking the form, mimicking the process and mimicking the entire ecosystem, so as the complexity increases you know this goes to the ecosystem level of like an ecosystem and also with the help of these like a biomimicry and biomimetic exercises we can always take help from like a nature for meeting our like a certain requirements.

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 Conscious Design



Wrapped around the trunk

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 Conscious Design

The DiFOLD Origami Bottle
Collapsible, Reusable Water Bottle



https://www.ayy77.com/posts/790864/Collapsible-Reusable-Water-Bottle-Made-100-Percent-of-Recycled-Paper-Course-ecm778cm_mediaworld_title

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And with that we have already discussed some examples, some beautiful and appealing examples also from across the world and also I would like to give you 2, 3 examples again at this moment you know so that it remains with you, so that you can think of like you know the creative ways in which you can you know come up with this solution even in the difficult of the difficult situations and the context and also you remember this structure which was designed as a wraparound of these you know tall buildings.

So, this actually area works as a like a dining space for the like a people and remember for the like a awareness in this it is actually this packaging so a clear indication clear information about you know a product should end up actually where.

So, this kind of you know information must be actually labeled prominently, so that one cannot actually miss right and secondly going for like a you know these innovative solutions for like a product design you know so that we can fulfill our requirements as well as we can satisfy other needs also you know is the actually need of the hour and this actually consciousness is the like a conscious design because we are not just designing like mindlessly, but we are designing with a certain intent.

(Refer Slide Time: 29:24)

The slide features the NPTEL logo in the top left corner. The main title, "Design consciousness ...", is enclosed in a red hand-drawn circle. Below the title, a paragraph describes a project by SPBR Arquitetos in Ubatuba, Brazil, aimed at minimizing environmental impact. A photograph on the right shows a modern building with a lush, green courtyard and a staircase. At the bottom left, there is a small video inset of a man speaking. The bottom right corner contains the text: "Week 1: Definitions and Perspectives on Sustainability in Industrial Design and Built Environments", "Lecture 4: Technological interventions into building design", "Course: Strategies for Sustainable Design", "Dr. Shiva J", "IIT Hyderabad, India", and the IIT Hyderabad logo.

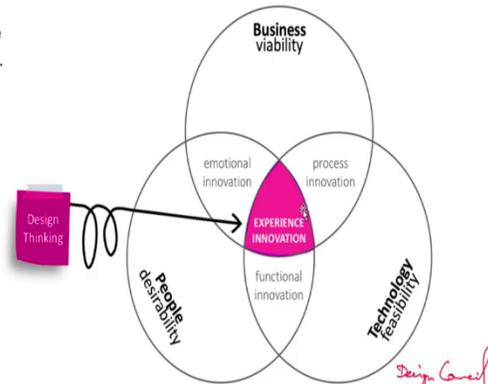
So, this is where actually from like a conscious design to the like a design consciousness actually comes up in the picture. So, you see you remember this example you know so this is actually this pathway you know or the staircase you know which doesn't exerts any like a rigid and hard structure beneath it but it allows the grass and other greener actually these plants to grow even beneath this.

So, this is actually this is where the design consciousness comes into picture, so we must actually understand and learn and utilize actually these notions of like a you know handling nature very carefully.

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Innovative thinking ...



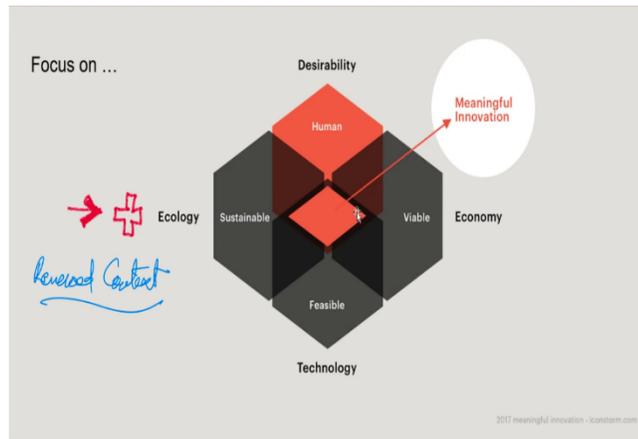
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So, this is where actually this experience innovation and the design thinking comes into picture. So, you must actually take lessons of your design thinking I would recommend right as like a next course to like a after this course you can go for like a taking this design thinking course right. Where we will learn about how to you know come up with the solutions in like a given context.

So, on the cusp of like a business viability you know people like a desirability, technologies like a feasibility you know we can go for this innovative actually solution, innovative actually design thinking solutions.

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And under these actually these are 3 like a note of this triangle, another introduction of this ecology and sustainability has introduced so now they have become like 4 nodes you know with coming up with the meaningful solutions at their confluence. So, this is what actually we need to adopt in our like design exercises.

(Refer Slide Time: 31:26)



With the help
of ...

POLLUTION CONTROL LAWS <ul style="list-style-type: none">Environment Protection Act (1986-)Water pollution (1974-)Air pollution (1981 -)Noise pollution (2000 -)Hazardous substances and organisms (1989-)Climate change related- Ozone depleting substance (2000-)	OPERATIONAL NOTIFICATIONS <ul style="list-style-type: none">Pollution Control BoardEnvironmental Impact AssessmentEco-Labeling
CONSERVATION RELATED LAWS <ul style="list-style-type: none">Indian Forest Act, 1927Forest Conservation Act, 1980Joint Forest Management Circular (1990-)Wildlife Protection Act, 1973Coastal Regulation Zone notification (1991-)Aquaculture Authority notification (1997-)Biosafety and Recombinant DNA Guidelines (1989)Biological Diversity Act, 2002	PROCEDURAL LAWS <ul style="list-style-type: none">Constitution- Eleventh & Twelfth SchedulesAppellate Authorities & Environmental TribunalsPublic Liability Insurance Act, 1991Provisions of Indian Penal CodeProvisions of Criminal Procedure CodeProvisions of Factories Act, 1948



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And all of this should work with the help of the land, the law of the land you know as far as like a environmental protection and the biodiversity actually protection acts you know the wildlife protection acts and other like a procedural laws and things are concerned, so we can always work around these laws to comply with the law of the land and the overall planet itself.

(Refer Slide Time: 31:49)



ITGn
Role model

Overall Project Impact: 23.89

Impact on site: GREEN LEED rating

Rating	Score
75% - 85%	1 star
65% - 75%	2 star
55% - 65%	3 star
45% - 55%	4 star
Less than 45%	5 star

15.89

Resource Impact

Section	Base Case Impact	Reduction in Impact	Reduction in Impact Achieved	Consultant	Status
Heat Island Calculation	100	4	96.20	Not Assigned	Submitted for rating
Energy	100	27	73.00	Not Assigned	Submitted for rating
Water & Waste Water	100	30	30.00	Not Assigned	Submitted for rating
Solid Waste Management	100	100	100.00	Not Assigned	Submitted for rating
Sub Total	400	161	238.20		

Environmental Quality

Section	Base Case Impact	Reduction in Impact	Reduction in Impact Achieved	Consultant	Status
Site Planning	100	100	0.00	Not Assigned	Submitted for rating
Energy	100	73	27.00	Not Assigned	Submitted for rating
Water & Waste Water	100	100	0.00	Not Assigned	Submitted for rating
Solid Waste Management	100	100	100.00	Not Assigned	Submitted for rating
Transport	100	100	100.00	Not Assigned	Submitted for rating
Social	80	73	7.00	Not Assigned	Submitted for rating
Performance Assessment	0	0	0.00	Not Assigned	Pending
Sub Total	580	546	34.00		

Source: GRIHA



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Source: GRIHA
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TATA Hall
Role model

HARVARD BUSINESS SCHOOL GREEN LEED-NC V3 LEED PLATINUM 2014

HBS TATA HALL EXECUTIVE EDUCATION CENTER
HARVARD WAY, BOSTON, MA 02163
PROJECT PROFILE

PROJECT METRICS

- 48% water savings compared to an Energy Policy Act of 1992 baseline
- 43% reduction in energy costs compared to the baseline standard (ASHRAE 90.1-2007), estimated via energy modeling
- 5.2% of energy use (by cost) is provided by an on-site renewable energy system (PV)
- 92% of regularly occupied areas have access to views
- 90% of individual spaces, including bedrooms, have individual lighting controls
- 90% of individual spaces, including bedrooms, have individual thermal comfort controls

Grandfide achievement

Photo Copyright: William Raem Associates, Architects, Inc., 2014



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Some examples, we have already seen this is not tough this is not difficult it is already doable, what is needed is the right intent. So, we have the example of IT Gandhinagar actually campus design from our country and secondly, we have the example of like a other institutional campuses and buildings also from the around the world we have seen this Harvard Business like a schools Tata Executive Hall you know which is a design like a executed actually recently in the year 2014. So, these are the actually some examples where the right intent and design consciousness is actually used to minimize the impact.

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Bigger picture



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So, with all of this exercise we will be able to fulfill the sustainable development goals you know recommended by United Nations you know and as you already know these 17 UNSDGs you know in a way they cover each and every aspect and around the sustainable growth and development model for each and every human and other living forms and like a species also and including like the overall like a planet you know earth altogether. So, we must actually strive to fulfill like a these actually disease to solve the actually overall objective of sustainability.

(Refer Slide Time: 33:06)



Beyond Sustainability: Designing Regenerative Cultures

Living Systems Design
Pays attention to quality & quantity
Effectiveness- doing the right thing
Informed by a Systems View of Life
Thinking in patterns and principles

The SDGs as a bridge towards regeneration?

Depletion fossil energy stocks → Using renewable energy flows

Design of Technical Systems
Values only the quantifiable
Efficient - doing things right
Informed by Mechanism & Technology
Slow & fragmented thinking

Design of Living Systems
Pays attention to quality & quantity
Effectiveness- doing the right thing
Informed by a Systems View of Life
Thinking in patterns and principles

Regenerative Development

Regenerative Development
Using renewable energy flows

Conventional (staying within the law) → **Green** (a little less negative impact) → **Sustainable** (adding no additional harm) → **Restorative** (humans doing things to nature) → **Regenerative** (humans doing things as nature)

Degenerative Cultures → **Regenerative Cultures**

<https://medium.com/@g-of-awareness/how-do-you-distinguish-between-regenerative-and-sustainable-design-454681a2c20>

Based on Patel, 2016 & Patel, 2018
Sustainable Design: Designing for a Better World
Indian Institute of Technology Hyderabad

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Strategies for Sustainable Design

- Thank you all -



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Well, how this can be done? So, how we have been actually living conventionally, how we have been actually manufacturing a stuff like conventionally, how we have been actually consuming things like a conventionally, so from that if you see the bottom of this slide over here, so from those conventional degenerative cultures we have to move to the like a greener culture you know we have to move to the sustainable approaches then from there we can go towards further like to the restorative actually stores stages and then from there we can further go to the regenerative actually stage.

So, this is a long way actually right now we are somewhere in this actually area right, so from here we have to reach to the sustainable level then restorative level then regenerative level. So, it is actually this living systems design what we are talking about it pays attention to quality and quantity effectiveness doing the right thing informed by a systems view of life thinking in patterns and principles. So, this is where actually the things will be at the right stage you know this is the right level and we can actually go for a sustainable solution of like a things.

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The next big change
coming in design is
“circular design”.



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So, the next big change has a like a submission to this course you know we can conclude that the next big change in design is coming as like a circular design. So, you must actually apply this concept in your designs.

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Strategies for Sustainable Design

- Thank you all -



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So, with this we have come to the end of this course all together, thank you all for joining this course I am sure you have benefited from this course. If there is any feedback any like a your like a feedback or any like a you know a thing you want to share with me you can definitely send an email to me I will definitely reply. I try replying you personally for your attention right, so thank you all very much, thank you for being with this course all along right.

I am sure you have learned and I am expecting some positive response because after all spreading this awareness is also important this course is not just a course it is actually a lesson where we are learning like how to live our life sustainably, how to produce things sustainably, how to make this like a better place, this earth a better place. So, with this we have come to the end of this course, thank you everyone for joining have a good day.