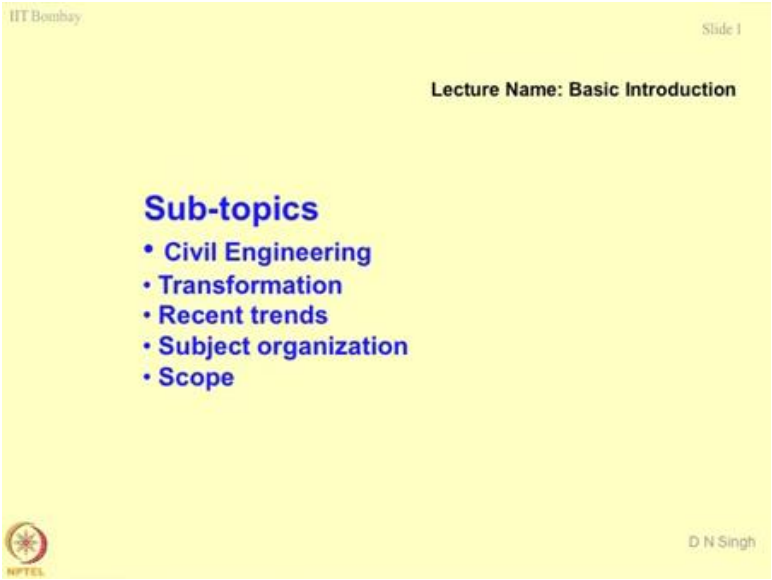
Environmental Geotechnics
Prof. D. N. Singh
Department of Civil Engineering
Indian Institute Technology, Bombay

Lecture – 04
Civil Engineering

Let us go ahead then in that case.

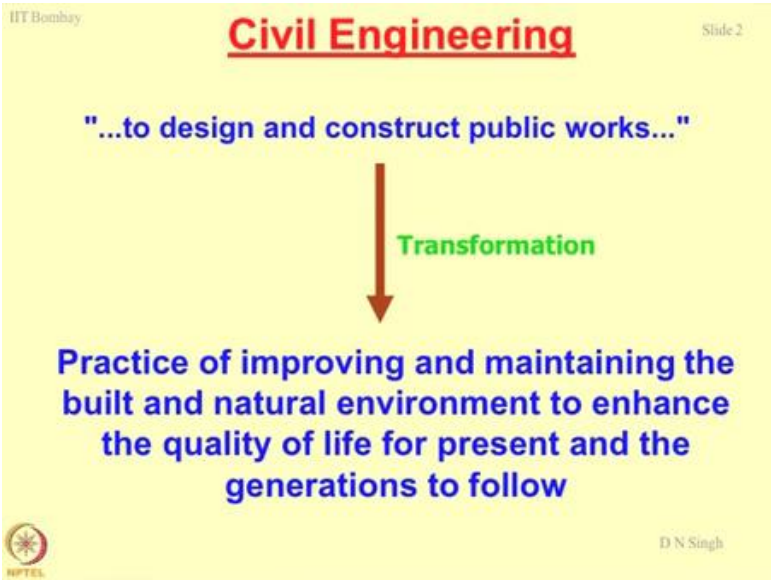
(Refer Slide Time: 00:20)



These are the subtopics which I intend to cover in today's lecture. I will continue with the definition of Civil Engineering. You may wonder that why it is important to re-question what civil engineering is and in what way the engineering is going through a transformation; in what way it is getting changed? What are the recent trends in civil engineering and a bit of subject organization that how these concepts are related to each other and of course, what is the scope of the environmental geomechanics.

Of course, I keep on citing lot of examples on and off just to give you an idea about what is that we are trying to focus on in the course of time and my efforts would be to give you as much as information possible which otherwise would be difficult for you to get or assimilate.

(Refer Slide Time: 01:50)



So, let us starts with the definition of civil engineering. The classical definition is to design and construct public works, I hope you will agree. But you have ever wonder that how this definition or the role of civil engineers is changing day-by-day. So, what I find particularly is that this concept or this definition is changing and there is a transformation. May be say 50 – 60 years back the role of a civil engineer was to construct and to design something, nowadays it is much more than that. I hope all you will agree. Any disagreement?

Now, this is what comes to my mind that the transformation has taken place in such a way that nowadays we are emphasizing more on the practice of improving and maintaining the built and natural environment to enhance the quality of life for present and the generations to follow. So, I am sure that you will agree with this fact that the scope of our studies has really gone much beyond what it use to be, say few years back and essentially what we are trying to practice now is we are trying to improve and maintain the built environment.

In western countries you will find that built environment or school of built environment is used as a you know synonym for civil engineering. There must be a reason that why people are shifting from conventional civil engineering world to built environment world includes lot of things, at the same time we talk about the natural environment also.

So, what I thought is that a civil engineer should be doing nowadays you should be trying to improve sorry, you should be trying to improve and maintain the built environment which is not natural which is manmade and natural environment which nature has given to you. Emphasis on to enhance the quality of life, is it not? This is what actually true civilization would have been if the quality of life increases and that is what actually our endeavor as civil engineer.

For present society and the generations which are going to follow; that means, we try to model what is happening today we try to forecast is these phenomena in the future terms down the line a few years.

(Refer Slide Time: 04:56)

I have got impressed with this definition of civil engineers or civil engineering profession which is which I have taken from AC website that civil engineers are the designers and builders of the quality of life, you agree with this? How much is true in the present day scenario? How many of you are really enjoying the quality of life? What you required to make life full of quality?

Student: Sir, to improve the quality of life we need to maintain a balance between nature and the artificial works we are creating.

Okay. So you find some imbalance there?

Student: There is certainly (Refer Time: 05:54) imbalance right now. There is growth is said that it is not a plant growth it is like even the cities they are growing like (Refer Time: 06:04).

That is very good.

Student: And that is why if there is a imbalance between nature and nature and the artificial world which we are living.

Built environment.

Student: Built environment.

Yes.

Student: (Refer Time: 06:20) and there are many problems.

But, why you are not happy with the word quality of life? Why do you think that the life which you are leading is not full of quality? Talk about all metros.

Student: From the air we breathe and to the water we drink that everything getting polluted sir. So, why do we think that we are leading a class and trendy life? It is not like we have water is not pure, air is not pure. So, I disagree with that.

Ya..That is right.

Student: Sir.

Yeah.

Student: Environmental norms are not being followed, that is why I disagree.

Yes, please.

Student: Quality of the life is not improving (Refer Time: 07:13).

So, this is state of mind that is true, but why a state of mind is that we are not living in a non chaotic world? Why we say that we are staying in a chaotic world?

Student: Actually though India is a developing country, the development what is happening is unplanned. We are looking only about the present we are not thinking about our future generation, it will follow us and what about what we are preserving for them.

That is right.

Student: Other than this hazardous waste, full of pollution what we are going to as a pressure we are giving not a quality.

Student: Or you can say development (Refer Time: 08:06).

Student: That we can.

Good. So, I think most of you agree yes please.

Student: Actually this statement quality and life quality of life like actually we are not giving a quality to society also. Like suppose take a example of Bandra-Worli this fly it's constructed over.

Sea link; sea link.

Student: It is only it is only 25 days starting peeling of its top surface, wearing surface. Its bitumen layer is going out.

So, like when you talking of a (Refer Time: 08:40).

That is right. Yes, please. You want to say something Sneha?.

(Refer Time: 09:16)That is right. In the name of development, we are destroying us.

Student: Natural.

Natural environment.

Student: Natural environment.

You are right actually most of your answers are that you are not satisfied with what is happening in the present day world and you are not satisfied with the present day society.

Now, we if you try to analyze what is the reason what we will notice is that though we are suppress supposed to be creators of the civilized society, but what has happened is that we have ignored the environment and because of ignorance you know all this chaos has got created and which is getting reflected in the fact that we are not leading a quality life. In my opinion civil engineers job or the profession is to create civilized society.

The second issue is we were supposed to provide solutions to the needs of developing global population, is it not? In Hindi we call it as Roti kapada and Makhan; so, basically proper food, proper shelter and means to keep them occupied employment. See, this is you will find that civil engineering basically interfere bit with sociology also because we are basically dealing with the problems which are related to social issues.

So, role keeps on increasing to see the point or the bullet number 3, there I have written civil engineers are performers on a world stage as strategic thinkers and global managers. So, right now what builders are doing in the cities they are trying to you know develop few pockets societies, but truly speaking we have to come beyond this come out of this out of the box thinking we have to start telling that this is not the only role of civil engineers. We have to talk about development of you know global scenarios countries continents and so on.

Civil engineers are supposed to be pillars of the local economies also and creating and maintaining complex infrastructure in wealth creation. This is something highly philosophical which I like to discuss here. People are trying to make money for themselves; everybody is trying to make money, but when you say the role of civil engineers was to create and maintain complex infrastructure in wealth creation. Should ask you a question here that why most of the wars being you know executed? Why people are fighting with each other? Why nations are fighting with each other? The direct implication is everybody is trying to create wealth for himself or herself.

So, if you really go into the philosophy of wars at least what comes to my mind is nothing, but acquiring things which are in others position. Be it petroleum.

Student: (Refer Time: 12:27) race of development.

Raise of development that is true that is right. So, ultimately what is the intention? The ultimate intention is to acquire things by hook or crook and become more powerful.

Now, this game can be played at the individual level, at the national level or international level. So, you if you reanalyze this statement, creating and maintaining complex infrastructure in wealth creation, so, why Iran, Iraq wars are going on. For acquiring?

Student: Oil.

Oil, gas, natural resources, people are fighting for water in our own country.

Student: Tamilnadu, Maharashtra.

Is it not? And soon if not the later we may start fighting for air even fresh air. So, this is how maybe the scenario is changing day-by-day. Of course, god save us that day should not come when we start fighting for fresh air even, but of course, this trends are already set in and we are struggling to find out few patches, green patches in metros and megacities.

So, basically this is a very philosophical discussion that what civil engineers are supposed to do and how our profession is changing and what you will notice is that truly speaking we do not fulfill, I would say even 50 percents of the requirements which are listed over here. So, what it indicates is that we are missing something; we should be included so that we may get solutions to different problems.

Now, this is there actually I am trying to interface the philosophy with the engineering I hope you will appreciate this point. For doing creation we had concepts of soil mechanics civil engineering and all we adopted everything, we constructed buildings, bridges, road, network and so on, but then we always kept environment at abeyance. We never bothered about what is the impact of this. So, let us see in what way we can really recapitulate and come back on the track so that we serve the society better.

(Refer Slide Time: 15:00)

If you go bit deeper what will find is the role of civil engineers have been divided in few subdivisions. It is very unfortunate that these days these subdivisions are being adopted based on GATE score. It is very unfortunate and what will notice is there is a sort of a compartmentalization that I am from structures, I am from construction technology, I am from geotech, I am from water resources and all, so on, but truly speaking for a scientist and for a mature mind these boxes or categories do not exist.

(Refer Time: 15:41).

I mean you have to cross these boundaries, you have to cross this compartmentalization of subject to understand in totality what is really happening and how the solutions can be obtained. So, all of you aware of structural engineering, construction engineering, urban planning, transportation engineering, water resources, hydraulic engineering. Please do not take it otherwise I have not pointed them or listed them in any order it is just the way it came to my mind.

Environmental, municipal engineering, geodetic which is survey and remote sensing, coastal and ocean which is offshore engineering and of course, geotechnical engineering. To be humble I have kept my own subject in the last I hope you will appreciate. So, these are the subdivisions which we are dealing with. The best model would have been if a geotechnical engineer interacts with structure engineers. Now, only what we call this phenomenon as soil structure interaction.

So, whenever we see two faculty members one from geotech, one from structure talking to each other we always call it as soil-structure interaction. Similarly, somebody from hydraulics talking to a person from geotechnical engineering we always call it as.

Student: Soil-water interaction.

Soil-water interaction. So, there is a need to you know increase this interaction make it as a multiphase interaction. Soil-water-structures-environment interaction and we can't under mean any of these you know professions or subdivisions as such. If you really want to do good technological work in the present day circumstances what is changing over here is more interesting. Now, this is a interesting statement you agree with this or not.

Student: Yes. Prevention is better than cure.

All right. So, I always say civil engineers are better than doctors. Of course, the perception in society is totally different whereas, as far as I am concerned I always remind to myself that look civil engineers have saved more lives than all the doctors in the history of this civilization.

Student: Doctors not agree with this

Why? Sorry.

Student: Doctors not agree with this.

Let them not agree we have freedom to say anything in this class room. Nobody is going to come and you know punish me. So, this is the self thought expression I mean like when you that is what I said in my first lecture normally I do not teach I just share my ideas with my young colleagues, that's it. I mean I have not taught anybody till now. I hope you will agree with this. It's basically the process of sharing the information and sharing the ideas which make your mind more matured. And the reason is this that we provide clean water and sanitation system and that is the reason that the society is still very healthy and you know whatever you have seen society as this.