Environmental Impact Assessment
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Lecture - 35
EIA – Climate and Climate Change – Part I

Welcome to the course, Environmental Impact Assessments. Today, we are going to look into methods involved in assessing climate change under the larger ambit of methods in EIA. Assessments for climate change in EIA are not very well established or it is not very clear in many countries including ours, we however cover many aspects of it under the ambit of air quality evaluation. Nevertheless. it will be useful for us to learn about the developments in the other parts of the world. We will follow chapter five of the textbook to which we are referring for this particular course, Ricky Therivel and Graham Wood for this particular session.

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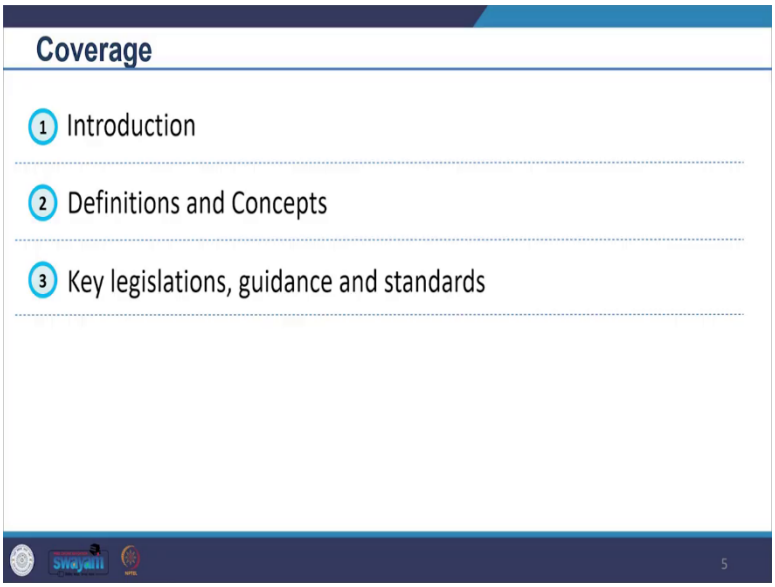

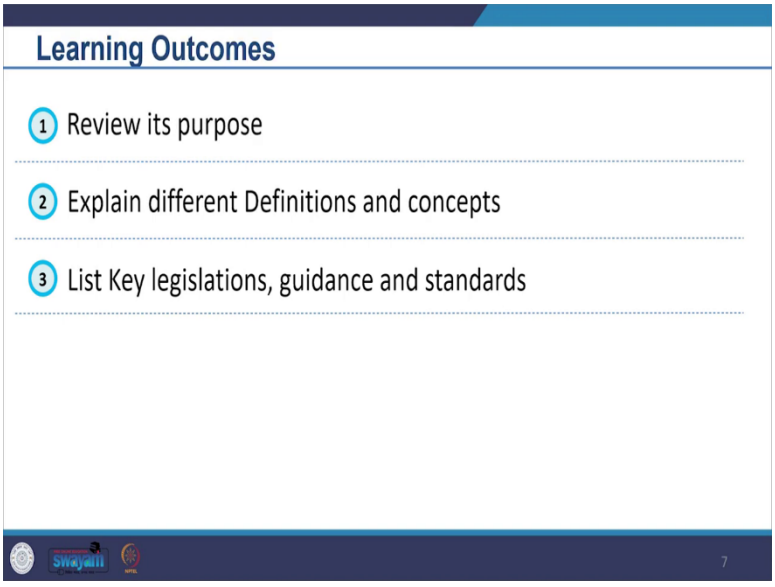

Accordingly, the coverage will include, will have a basic understanding, then we look into definitions and concepts, and then we look into key legislation guidance and standards.

So, accordingly, after the completion of this session, you should be able to review its purpose, and why we need to do it. You need to explain different definitions and concepts involved in this particular theme, you should be able to list key legislations, guidance, and standards in this domain. You may recollect that in the initial lectures, we looked into the drivers of climate change through the readings of global environmental outlook 6.

We learned that climate change has become an independent driver by itself and it is causing environmental change and poses a serious challenge to future economic development. Climate change poses a risk to human society and impacts on food and water security. This is well well-established fact, however, requires more work to understand it. Nevertheless, it is well established that climate change increases the existing risks and creates new risks for natural and human systems.

We have seen that our activities and human activities have caused climate change and impacted ecosystems have transformed the earth's natural system, it has exceeded, we have exceeded the capacity and have been disrupting the self-regulatory mechanism of the ecosystem and these are irreversible and we have irreversible consequences because of us.

We also saw that our environment is so seriously affected by ongoing changes, such as climate change and land use change, especially because of deforestation, that these have reached the point that the ecological foundation of our society and national system that supports life is in great danger, so we are at the points now where we encounter the danger.

Before us, it was a big challenge to survive with this range of human-induced damages, including climate change, deforestation, desertification, and loss of biodiversity. We also see the scarcity of natural resources, pollution, and the consequent natural and associated environmental impacts.

Therefore, climate change is the most serious environmental challenge we are facing now, and it is said to be not only physical, but also a political, social, and economic challenge this problem requires action at various levels at global, national, and national, local as well as individual scale.

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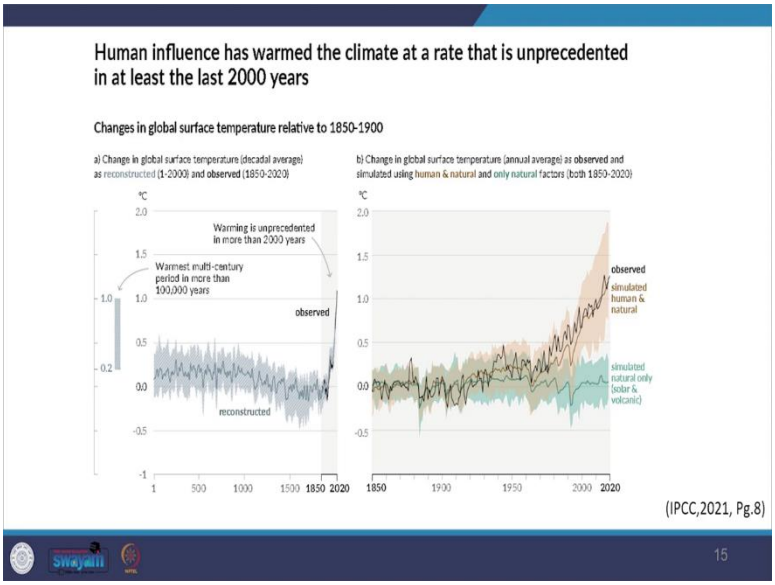

You can see the snip from IPCC Assessment Report 6, 2021, where they show the rate of climate warming in the last 2000 years. On the left-hand side, you can see the change in the global surface temperature which is the decadal average, we can see here and in the right-hand side average change in global surface temperature. You may notice how the line is shooting up in the recent past and we have also provided the link for this report to you for further reading if you wish.

As per the report, limiting climate change will require whatever change we are undergoing, and limiting that will require a substantial and sustained reduction in greenhouse gas emissions. For this, the first legally binding agreement was the Paris Agreement in December 2015, where 195 countries committed to holding the increase in global temperature to well below, 2 degrees centigrade above the pre-industrial levels, and to pursue efforts to limit the increase to 1.5 degrees Celsius above pre-industrial levels. Considering that, this would significantly reduce the risk and impacts of climate change and we will also allow adaptability, it will allow climate resilience, it will allow us to foster climate resilience, and ensure food security for all.

So, countries have agreed to meet every five years to review their targets like you recently witnessed in Cop 26, provided the link to these reports as well if you want to review them. In this context, we see that EIA is an important tool, so since we are studying EIA it is an important tool. The EIA process can assist in making it possible to review newer projects in line with climate change mitigation.

We also see that in past decades numerous regulatory and funding agencies such as the World Bank, the Organization for Economic Cooperation and Development OECD and the European Union have issued regulations or guidelines requiring or promoting the consideration of climate change in EIA procedures, so all of these emphasize on the usage of this. Also, the International Association for Impact Assessment IAIA has published best practice principles.

So, many of CO_2 emissions concerns are addressed through air quality assessment, so we see that if it is not specifically described many of them are cons, and many of the concerns are addressed through air quality

assessment. Mostly in EIA assessment evaluation, we see is limited to evaluating emissions and check is kept at the ambient air quality, so that is what we have been mostly doing.

However, there is still limited initiative to check the effects on the global climate, so we are not checking in this process how the impact is on the global climate or we do not undertake cumulative effects or look at the adaptation to climate change within the EIA framework, so we are currently only looking at the emissions and not at the cumulative scale or the global scale and we are not even looking at the adaptation part of it.

So, the reason what has been explained is that it is very complex to establish a causal relationship because of multiple factors playing roles, so it is not a very simple thing but if multiple factors play, there is a lot of interaction that takes place, so it is a complex thing to estimate concerning this, so that is another reason why it is not being done in many places. We see that as per the climate change policy, the climate change requires to be addressed at two stages.

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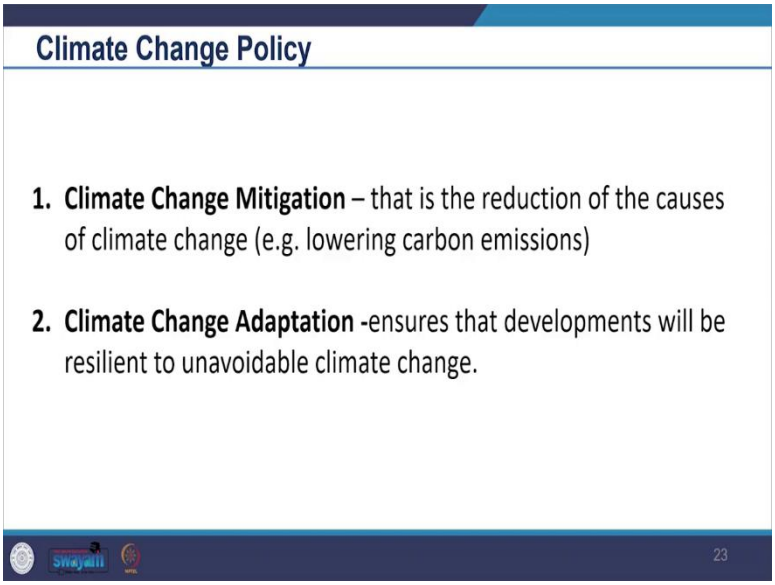

So, we see that first, we need to address climate change mitigation, another term is climate change mitigation which conceptually looks into reducing carbon emission. So, when we talk about climate change mitigation, we are specifically talking about reducing carbon emissions.

Second, through climate change adaptation when we talk about adaptation, we conceptually look into resilient developments where we can handle the unavoidable climate change, so whatever comes we can face that, so we talk about, talk about these two things. Further, we also looked at the interaction between the two, so we looked at the interaction between the mitigation as well as between the adaptations. So, these are the major concerns when we look into climate change.

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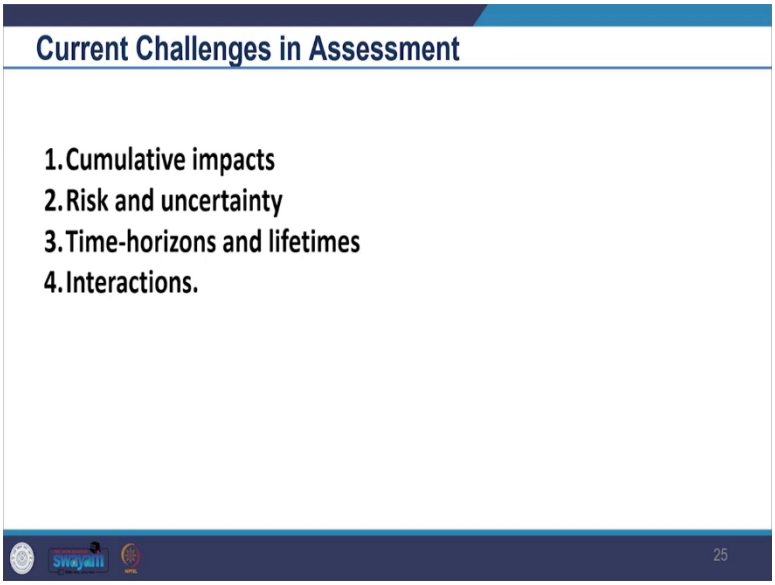

Currently, there are challenges in assessments concerning climate change, because of the following reasons, you see that it is very difficult to undertake cumulative impact, it is very difficult to determine the risk, and there is also involved uncertainty. As well as we see, fixing the time zone is also a challenge, like the life span of a project or beyond that, so the timeline is large, so fixing that is also a challenge here, and then also identifying the interaction, because there are a lot of factors which play come into play, so identifying the interaction is also a complex path here.

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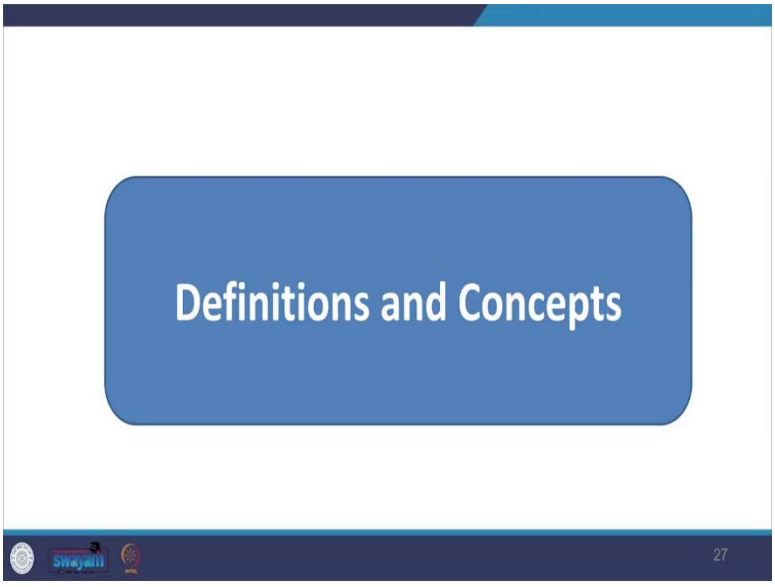

Now, let us look at a few definitions and concepts when before we get into the climate change assessment part. We may note that in climate change reference, mitigation is slightly different and we are going to follow IPCC report definitions here.

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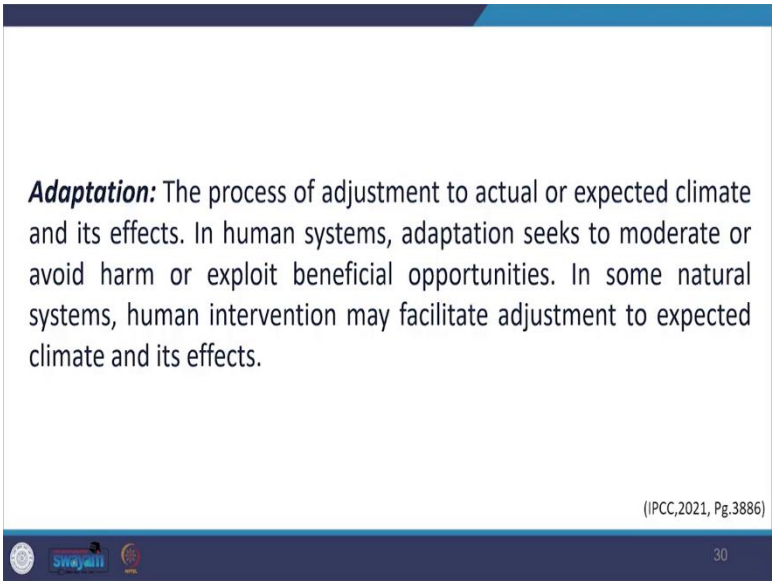

So, adaptation means the process of adjustments to actual or expected climate or its effects. So, when we look at this how do we adjust to the changes which will happen? So, in our system through adaptation we moderate or avoid damage or harm or we tend to exploit the benefits of the opportunity that comes with the change, so that all is termed as adaptation.

In a natural system, the process of adjustment to actual climate and its effects happens and it is also possible that through our interventions, we may facilitate adjustment to expected climate and its effects, so by our intervention also our adaptation can take place. Let us now look at what adaptive capacity means.

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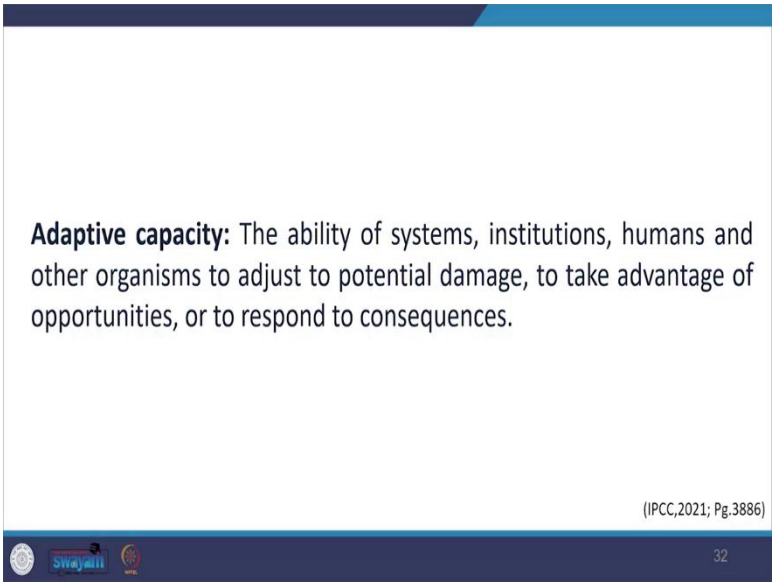

Adaptive capacity means the ability of our systems could be the institutions, our human systems, and the other organisms, which adjust to the potential damage or even they can take advantage of the opportunity, we look at our adaptive capacity, so through these mediums, through the institutions, our systems how we can handle this damage or take advantage of this damage, so that is termed as the adaptive capacity or even not only handle the damage or the opportunities but to also respond to the consequences or the results of the damage, so whatever happens, how do we respond to that?

You can think of various situations where you or your family has adapted to the changes that happened which could be positive or negative whatever changes happen, so how you or your family adjust to that particular situation and think of the capacity in terms of the financial capacity, social capacity, which allowed you to adapt to the situation.

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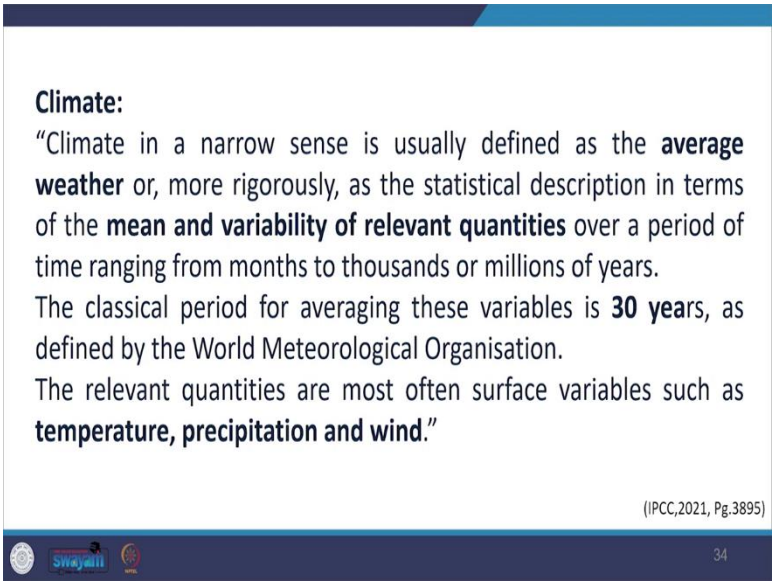

Now, looking at the term climate, climate as given by IPCC in a very simplistic way we call it average weather, in statistical terms we look at the mean the average, and the variations variability of the relevant quantities over some time and this period can range from months to thousands of millions of years, so we look at those statistical descriptions here.

The classical period when we look at these durations, the classical period which we consider generally ranges from 30 years as given by the World Meteorological Organization, WMO, and it can be beyond that as well and then the relative quantities which we look at mostly when we refer to this is temperature precipitation and wind those are the things, which we look at and in a broader sense climate can be defined as the state of climate system, so what is the state including the statistical description. So, this is about the climate.

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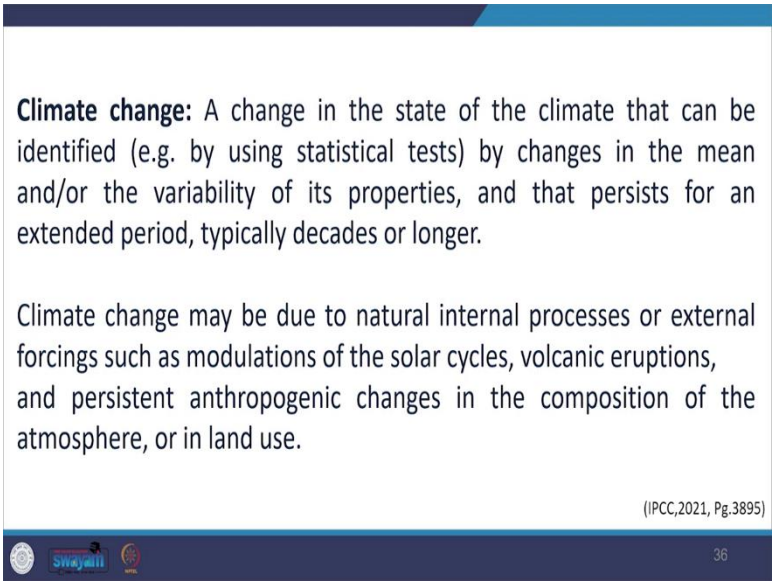

Now, looking at climate change, climate change is a change in the state of the climate, so we saw what climate means and then how that climate the state of that climate changes and that can be identified by the medium of statistical tests. So, we see, we describe it statistically and we would see how those variations are happening such as the variation could be in terms of mean or the variability of its properties those properties which we discussed about.

And that change so whatever change happens that lasts for a longer period such as for decades or even longer than decades so when such kind of variations happen, then we call it climate change, climate change can happen both naturally or by activities, our activities, so we see those changes can happen.

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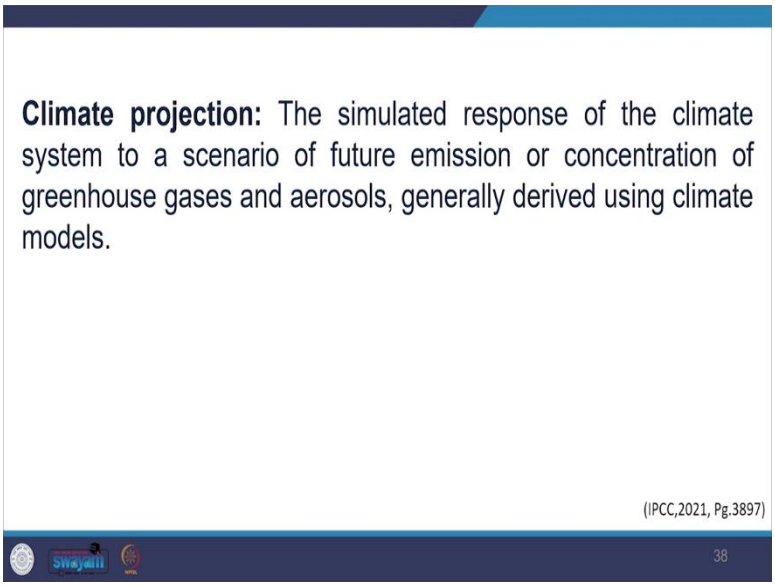

Now, looking at climate projection. So, climate projection is the stimulated results of the climate system to the various scenarios, so we see what kind of scenarios will happen and how our climates would be so that that that is about the climate projection climate projections are different from predictions, so mostly how it is different that, it the projection relies on various assumptions, so we are making certain assumption related to

with emissions or even the political system or the social context, so we make project assumptions which we look at various scenario which is created so that is where we look at climate protection.

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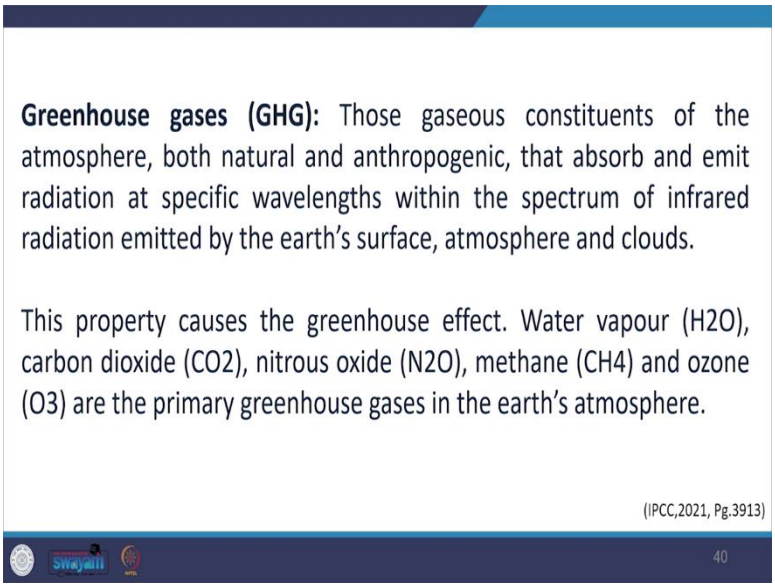

Now, looking at greenhouse gases, this is one of the key elements of climate change. Greenhouse gases are gases constituents of the atmosphere that are both natural and anthropogenic, anthropogenic means produced by human activities, and activities, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the earth's surface, atmosphere, and clouds.

This property causes the greenhouse effect, so we see various like even water vapor, major concern is on carbon dioxide, nitrous oxide, methane, and ozone are the primary greenhouse gases in the earth's atmosphere. So, moving forward now we will look at impact and what we understand when we talk about the impacts concerning climate change.

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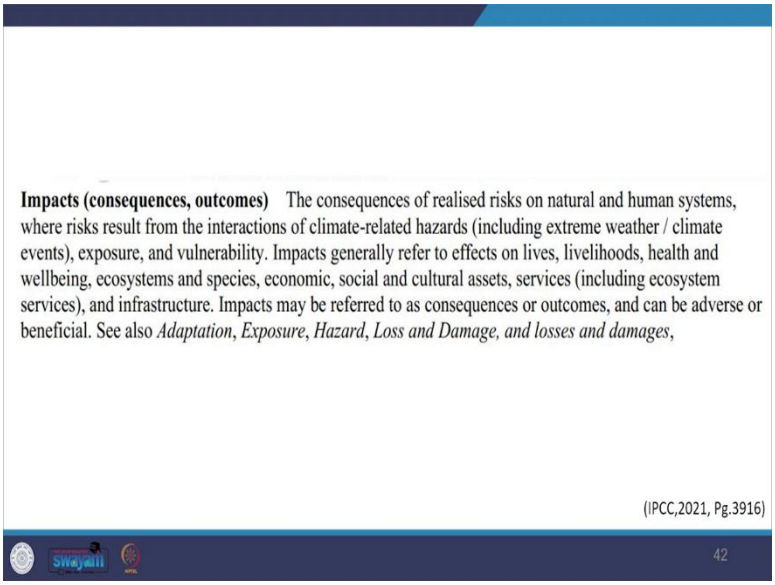

Impact term is used for the results effects of realization of the risk on natural and human systems, so whatever risk we are predicting, if we realize what kind of results would happen, that is the impact. The risk results from climate-related hazards, that includes like the climate-related hazard would include extreme weather and climate events, exposure, and vulnerability, impacts usually refer to effects on lives, so when if an impact happens, it would be not just the physical impact or the casualties, it would be on livelihood, health, well-being, ecosystems, economies, societies, culture, and even it may hamper the ecosystem services, and also the infrastructure.

So, we see what impact could be so the results of the risk and risk we have seen are coming from the interaction between hazard, exposure, and vulnerability. Now, looking at mitigation in the context of climate change.

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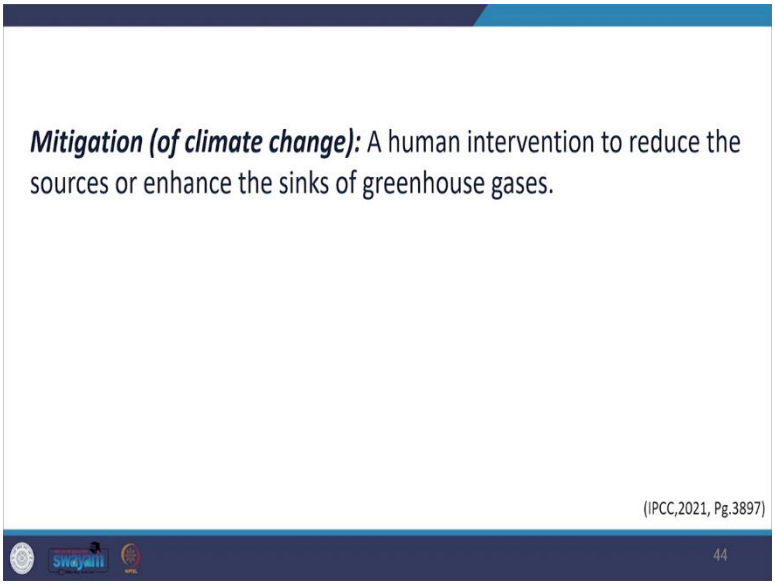

Mitigation is a human intervention, so how do we reduce it, what and you can do to reduce the source of the problem, how we can cut it down or enhance the absorption capacity, how we can take away the greenhouse gases from the environment? so that is what is concerned when we talk about mitigation and the context of climate change.

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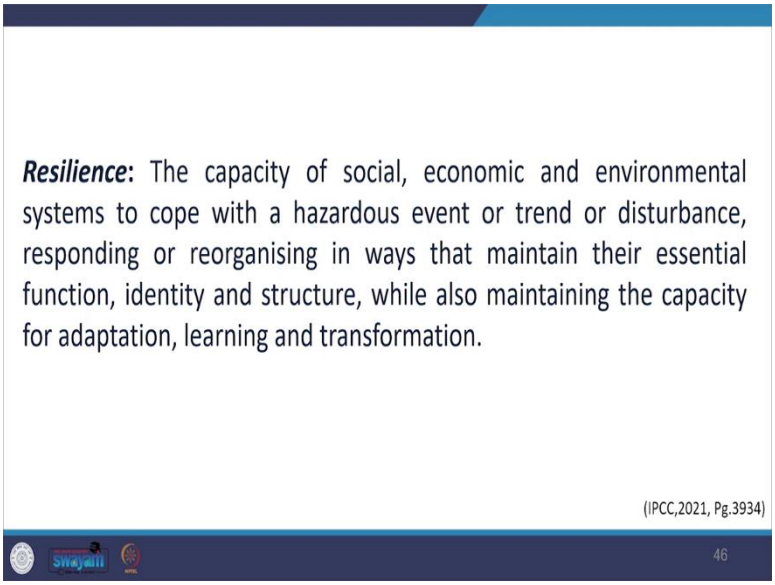

So, now looking at the term resilience. So, resilience what do we mean by the term, resilience is the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, so how do we cope with that? And how do we respond or reorganize in ways that maintain the essential functions, so how we can get back to our minimum function, so whatever essential functions are there we can maintain those functions? And then identity and structure while also maintaining the capacity for adaptation, learning, and transformation, so we maintain the minimum qualities that are required in the given situation, so that is what is termed as resilience.

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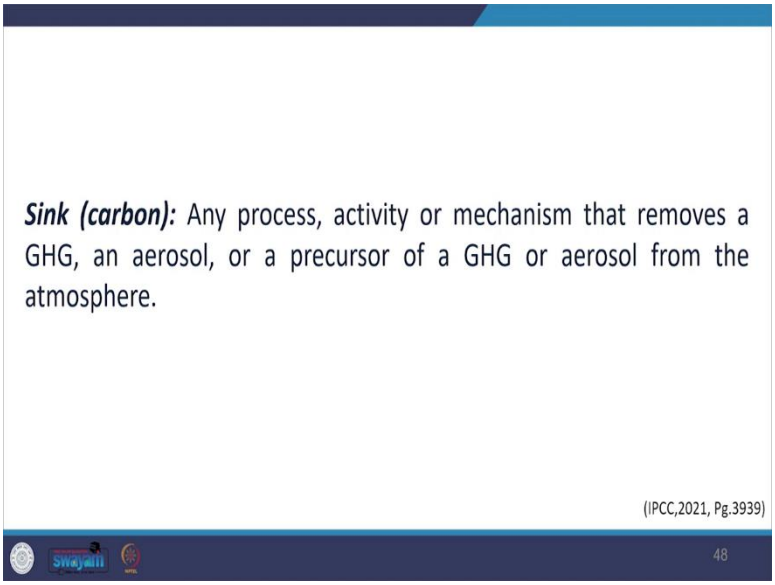

So, now looking at the term sink, sink here in this context is a carbon sink and it refers to the processes or the activities or mechanisms that remove greenhouse gases and aerosol or a precursor of greenhouse gases or aerosol from the atmosphere. So, whichever removes the process or the mechanism or whatever activity removes it from the environment removes the greenhouse gases from the environment is termed a sink.

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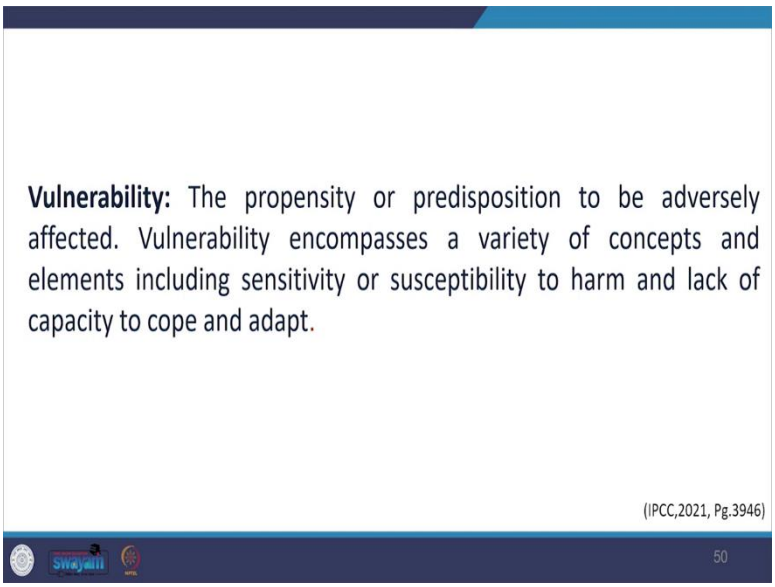

So, now we look at another term vulnerability. So, vulnerability is a tendency it is like individuals or communities tendency to suffer from a particular condition, so whatever conditions you are exposed to how sensitive you would be to that, how much you would suffer from that particular condition.

Vulnerability is an umbrella term that holds concepts and elements of sensitivity, so it is, it takes care of sensitivity, it also takes care of the susceptibility to harm, so how susceptible are you are, how sensitive you to any particular damage? So, vulnerability takes care of all those dimensions here, as well as it also takes care of the dimension of capacity, so your capacity, lack of capacity to cope or adapt is also covered under this vulnerability.

So, whenever we talk about vulnerability, it would be talking about the sensitivity, susceptibility as well as your capacity to cope and adapt, okay? So, that was about concepts and definitions which we saw now, we will move on to our next segment in this particular session.

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We will look at the key legislation, guidance, and standards that are in place, to review climate change. Literature indicates that several agencies and regulatory authorities have recently set requirements for climate change to be considered in the assessment process, and environmental assessment process, and the process understanding is still evolving, so we do not really have a complete understanding and it is not implemented everywhere.

As per the book, we are referring to Therivel and Wood's book, we see that there are only a few countries such as Australia, Canada, and the Netherlands who have implemented such regulations, so you can see how limited is right now implementation of this right now. This domain is still evolving, even we see in the USA, USA the Council of Environmental Quality has confirmed, so there is an assertion, that climate change falls within the scope of EIA, and it should be addressed according to the National Environmental Policy Act, NEPA, so it is acknowledged that. We see that some of the states such as California and the state of Massachusetts have incorporated climate change in their environmental assessment law within the state.

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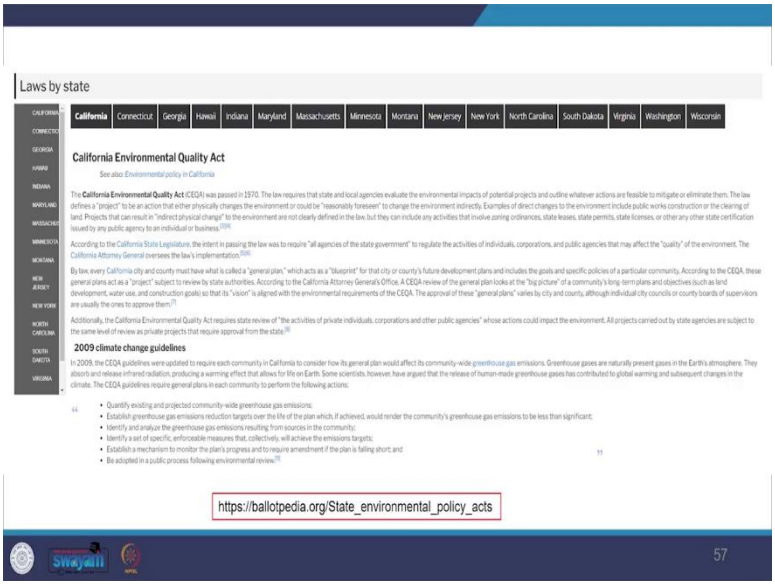

In the snip here you can see the California Environmental Quality Act and climate change guidelines. So, you can see the guideline here, it provides requirements to quantify existing and projected community-wide greenhouse gas emissions, and it provides input on establishing greenhouse gas emissions, and reduction targets over the life of the plan, your project plans, so you need to establish those greenhouse gas emissions, how much you are going to reduce, identify and analyze, the greenhouse gas emissions resulting from sources in the community.

So, you need to identify where the greenhouse gases are, and emissions are happening. Further, you also need to identify a set of specific and forcibly measurable measures that collectively will achieve the emission targets, what are your strategies, and what measures you are adopting, so that you can attain the target that all needs to be specified in your assessment report.

Further, you need to tell, you need to establish a mechanism to monitor plans how you going to monitor that and how you would adopt it in the public process, how this entire thing will be adopted. so all these have to be taken care of. So, here you can see the snip of the law from the California state.

So, countries have started incorporating it, however, how the assessment is undertaken, and the quality of assessment is very different across cases, so within the countries, you will see there is variation, and among countries, you will see variations. So, for example, some assessment reports provide detailed records of greenhouse gas emissions, they give a detailed quantification and sources of emissions, so there is a detailed inventory that comes in.

Some of the assessment reports provide a cumulative estimate of the total emissions, so they do not give the detail but they give you the cumulative estimate, whereas you can see in many of the reports that they do not even provide other details, it might only state that greenhouse gas emissions may occur because of the project and may leave out the other details, so there are variations how these things are handled in practice.

Further, we see in Canada, it is seen that the process of assessment requires consideration of changes caused by the environment as per the Canadian Environmental Assessment Act, CEAA. This act is a legal basis for the federal environmental assessment process, and this particular act sets out the responsibility and procedure for carrying out the environmental assessment of projects that involve federal government decision-making. So, we see that the act does not clearly state the climate change but has it in its process, so it has incorporated embedded climate change in its process, A link to the act is provided to you if you are interested in reading it further in more detail.

Likewise, you see in Australia, the Australian capital territory requires that all environmental impact assessment reports consider climate change. It requires the assessment report to consider both mitigation and adaptation parts, so we did talk about how more has been done on the mitigation adaptation is still very limited but in Australia, we see that they require both aspects to be covered, mitigation as well as adaptation path.

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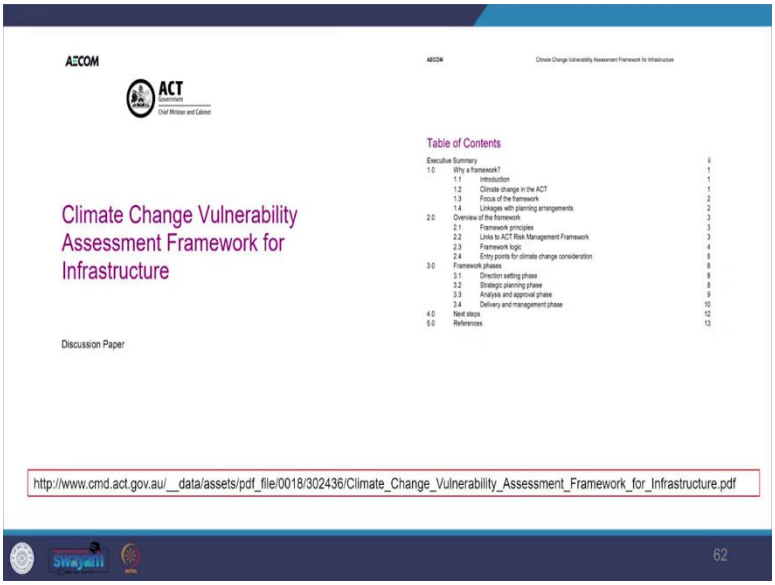

They have also developed a climate change vulnerability assessment framework, so you can also look at the vulnerability assessment framework which supplements the risk management standards for the planning developments, renewal, maintenance, and management of public infrastructure. So, this has been developed by them. You can see the snip of the report here and the link to the framework is provided for your further reading.

So, western Australia requires risk-based decision-making in the coastal zone to include an allowance for sea level rise, so all these details are given you can see the snip here, and also the link is provided for your further reference.

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In the European Union, in the EIA directives, we find distinct guidelines for integrating climate change, so they have issued guidelines for integrated climate change and biodiversity into EIA and then the link is provided to you, so you can see here how they have made suggestions for integration in the process. The new directive places much importance on climate change mitigation, and adaptation, as well as on resilience, it does it through the process of screening scoping, and assessment aligned with the Paris Agreement, so you see how stage-wise that particular review process is taken care of.

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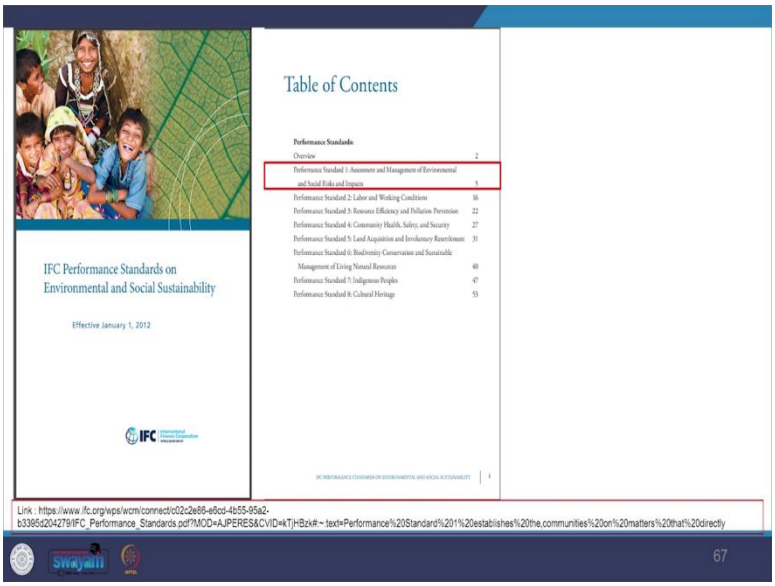

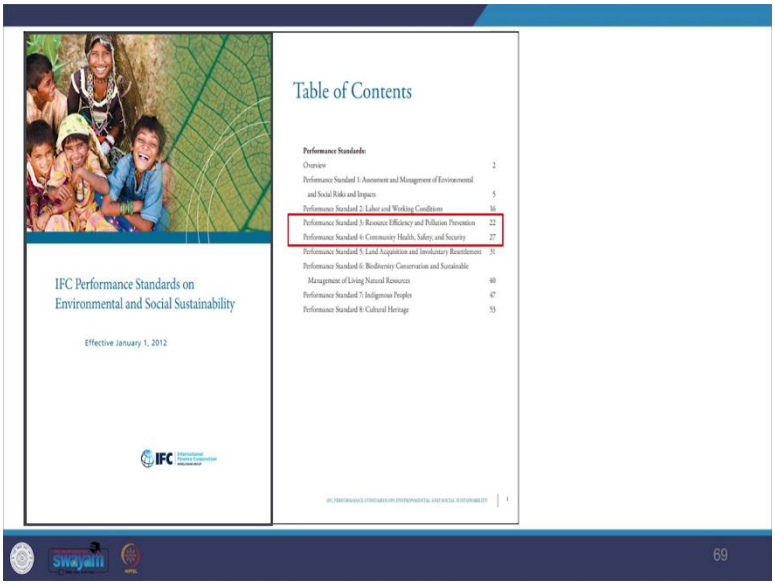

We also see that the International Finance Corporation, IFC of the World Bank also provides guidelines through performance standards on environmental and social sustainability. In its performance standard, you can see it has a sequence of standards. Standard one, which provides assessment and management of the environmental and social risk and impacts provides guidelines on climates along with the other issues we see here.

Likewise, you see performance standard 3, which covers the topic of resource efficiency and pollution prevention and further provides input on greenhouse gases, and how that has to be tackled. Likewise, you see performance standard four also covers the concerns in its theme of community health, safety, and security.

So, we see that IFC guidelines reinforce that one needs to identify the vulnerable communities and also look into the interaction of physical and socio-economic impacts, so not only undertaking this process but you need to be able to identify the vulnerable communities as well as to look at the interaction between all kind of impacts which are happening.

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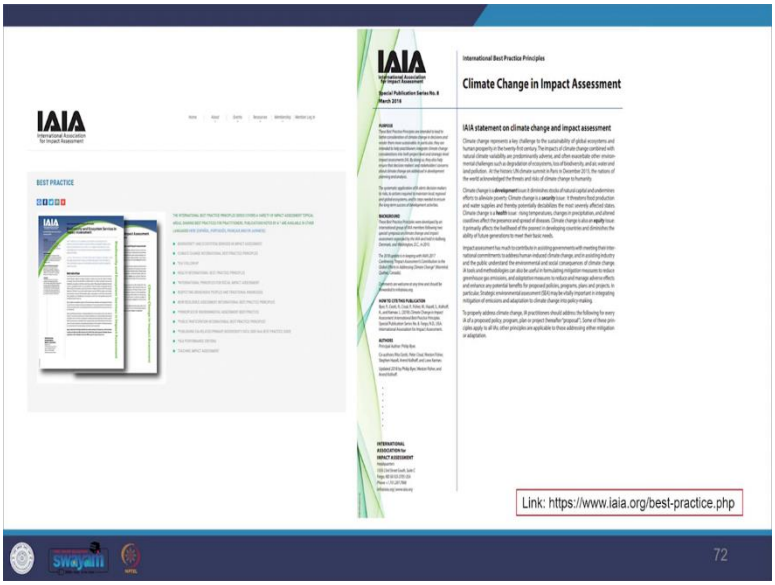

Further, we see the International Association for Impact Assessment IAIA also provides best practices guidelines on handling climate change and impact assessment. It provides key principles and how they might be operationalized through government screening, education of practitioners, and employment of local and indigenous knowledge, so how, what principles can be adopted and how that can be made can be implemented on the ground, so you see here the principles.

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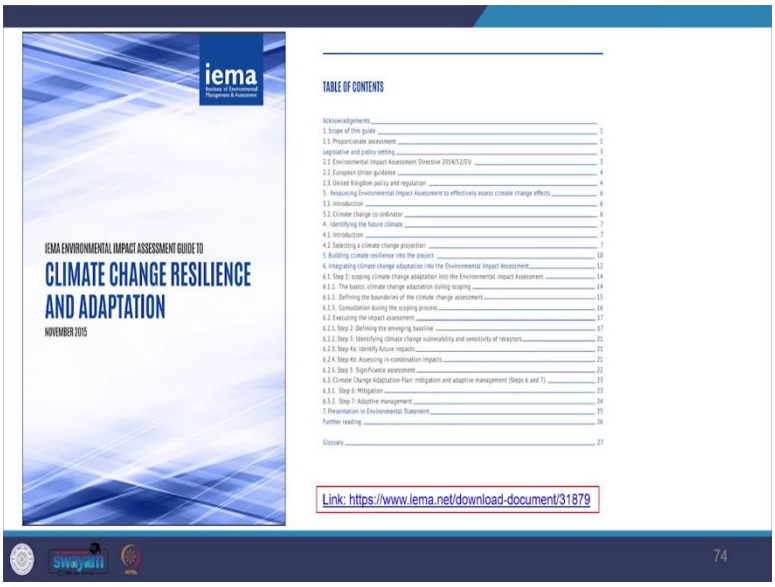

Further, we see the Institute of Environmental Management and Assessment, IEMA has also prepared detailed practice guidelines on integrating climate change adaptation into EIA. So, how that can be integrated into the process, you can see the snip of the report here, the link is provided to you.

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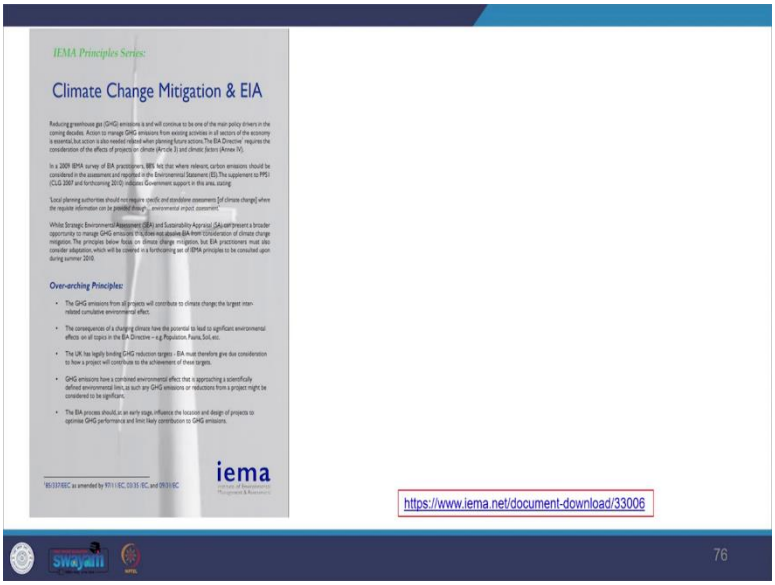

They also provide climate change mitigation principles, and also, they are making a guideline on this, so you can see it here. Further, we see that you have the Canadian Environmental Assessment Agency, CEAA published guidance for practitioners which was modified in 2012 on how to incorporate climate change considerations into environmental assessment.

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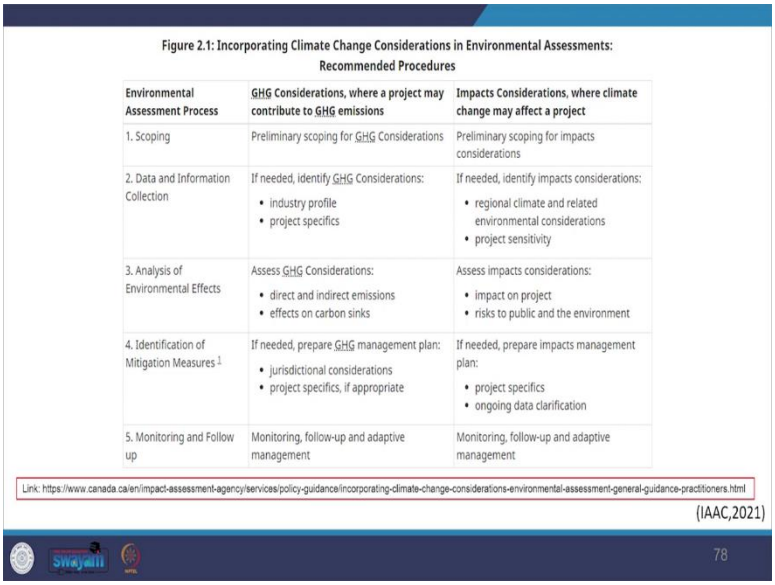

You can see the snip of the table from the guidelines, you may notice how at different stages climate change considerations are suggested to be addressed in the EIA process, so you can see here how various scoping stages and so on, how various aspects have to be taken care.

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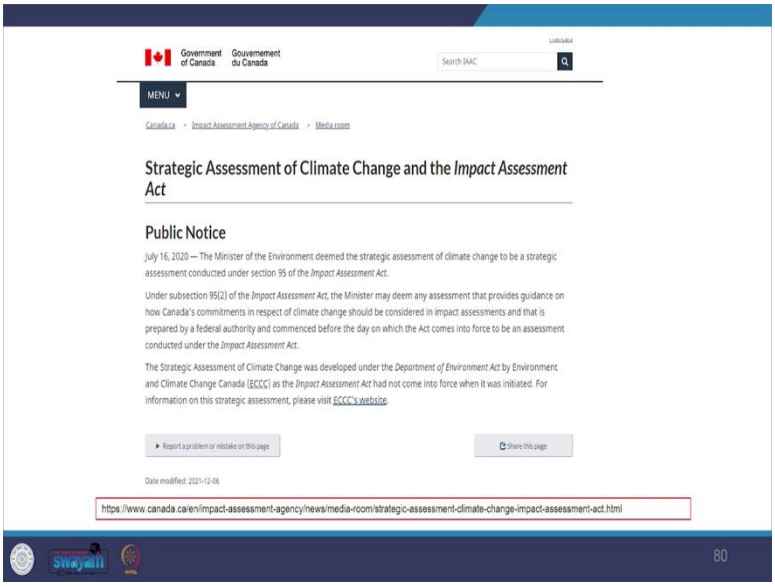

Likewise, you see they have issued guidelines for incorporating concerns of climate change in strategic assessment not only in the EIA process but also in the strategic assessment, so you can see here. Further, we see that in Scotland, this Scottish Natural Heritage, SNH provides guidance on EIA through the national planning framework and the considerations are inbuilt, so it is not very separate and distinct but it is inbuilt in its approach and emphasizes certain areas.

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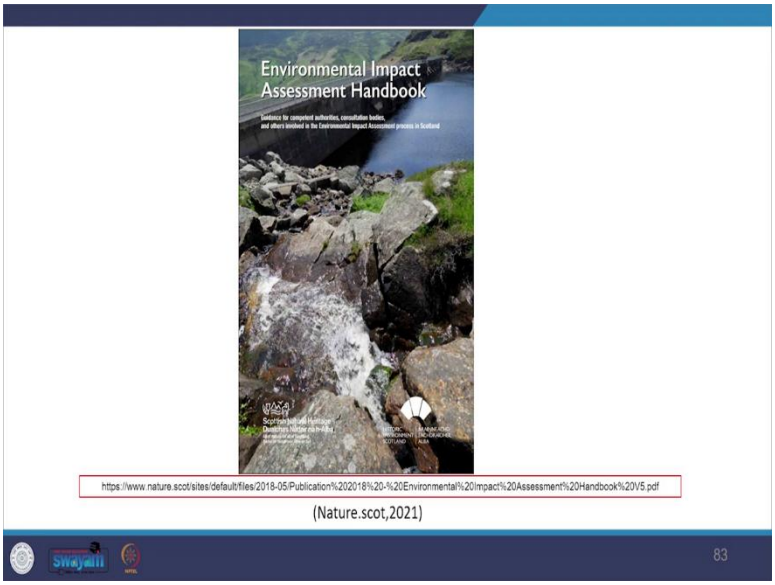

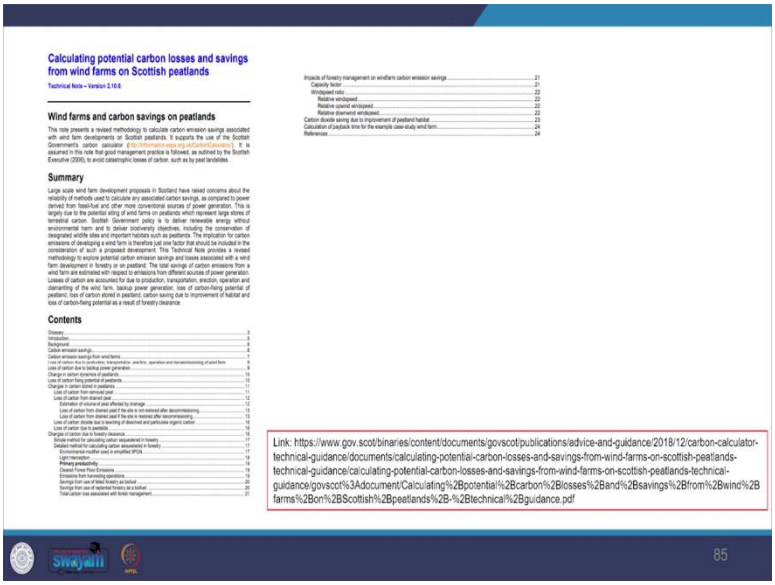

And we see that they have provided guidance on EIA which follows the national planning framework. We also find additional guidance for calculating potential carbon savings and losses arising from wind farm developments on peatlands in the form of technical notes by the Scottish government, so we see that.

This particular calculator is very helpful in establishing the environmental baseline for such projects. So, it is giving you the carbon calculator tool in the form of an Excel spreadsheet, so you can calculate these things, I have put the technical notes here for your reference. So, summarizing today's session, so will cover that is all in this particular session.

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Summary

1. Purpose and complexity around the impact assessment of the climate and climate change within EIA framework
2. Definitions and concepts
3. Key legislations, guidance and standards

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References

1. Therivel, R., & Wood, G. (2017). Methods of Environmental and Social Impact Assessment. https://lccn.loc.gov/2017010184
2. Environmental Impact Assessment Training Manual EIA Online Learning Platform www.iisd.org/learning/eia. (2014). www.iisd.org/learning/eia
3. USAID ENVIRONMENTAL IMPACT ASSESSMENT TOOL. (2017). http://www.usaidgems.org/sectorGuidelines.htm

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Suggested Watch

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So, summarizing we looked at the purpose and the complexity around the impact assessments related to climate change within the EIA framework. Then we looked at various definitions and concepts and then we looked at the key legislation guidance and standards which are available for assessment purposes. So, that is all for today these were the references used.

So, these are certainly suggested to watch and read for you to identify more and more of the areas and similar studies here. Please feel free to ask questions let us know about any concerns you have, do share your opinions, experiences, and suggestions. Looking forward to interacting and co-learning with you while exploring the subject of EIA. So, that is all for today, thank you.