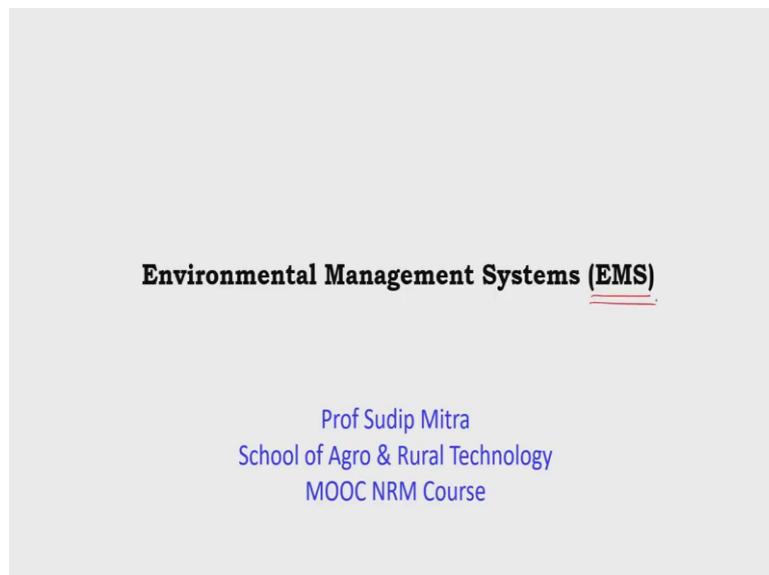


Natural Resources Management (NRM)
Professor Sudip Mitra, PhD
Centre For Disaster Management and Research (CDMR)
Head, School of Agro and Rural Technology (SART)
Discipline - Agriculture Engineering
Indian Institute of Technology, Guwahati, Assam, India
Week - 05
Lecture - 31
Environmental Management System (EMS)

Hello participants Friends, today we will be discussing about a very important aspect and that is Environmental Management System.

(Refer Slide Time: 00:40)



In brief, we call it as EMS, now environmental management system.

(Refer Slide Time: 00:48)

Environmental Management Systems (EMS)

- An Environmental Management System (EMS) is a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency.
- It is a framework that helps an organization achieve its environmental goals through consistent review, evaluation, and improvement of its environmental performance.
- This consistent review and evaluation identifies opportunities for improving and implementing the environmental performance of the organization.
- The International Organization for Standardization (ISO) developed an international standard, ISO 14001, to specify requirements for environmental management systems. An EMS is developed in compliance with the ISO 14001 standard as part of an organization's strategy to implement its environmental policy and address governmental regulations.
- An EMS approach incorporates periodic review by top management and emphasizes continuous improvement instead of crisis management.

2

It is critically important for natural resource management as well. And when we discuss about NRM, we must know about EMS because an appropriate environment management is critical for natural resource management as well. An environmental management system is basically a set of processes and practices that enable an organization or group to reduce its environmental impacts and at the same time increase its operating efficiency.

It is a framework that helps an organization or a group community in achieving its environmental goals like green environment, good water, good soil, suitable amount of biodiversity. These are the different environmental goals through a consistent review, evaluation and improvement of its environmental performance.

When we say environmental performance, it means that the resources that we will be utilizing for our sustainable living in any community or any locality, we need to see that, that utilization of these natural resources is optimum. And we are also taking care of its regeneration wherever it is possible.

So, the utilization of natural resources will be in sync with the environment management. Now, when we say about this consistent to review; this consistent review and evaluation identifies the opportunities for improving and also implementing the environmental performance of that community or organization or group.

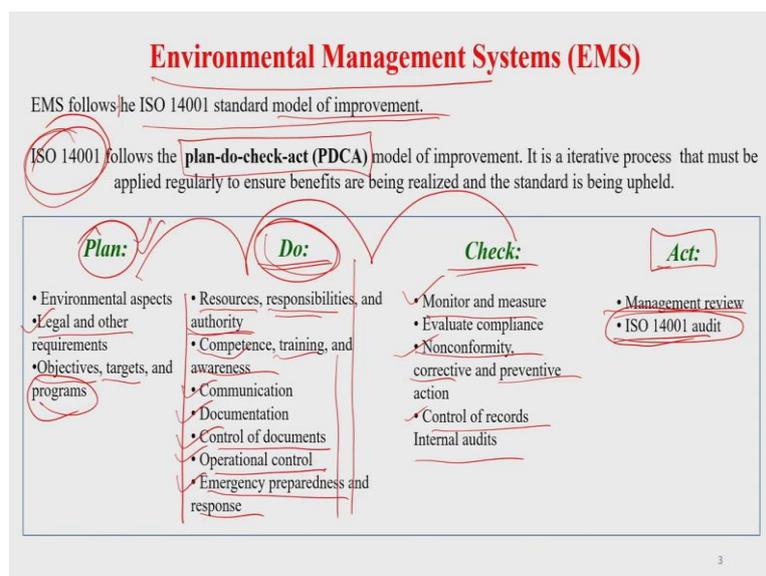
Now, there is an International Organization for Standardization, which we call as ISO. Many of you might know about this. ISO developed an international standard, which is followed by certain numbers like ISO 14,001 here, which specifies the requirements for environmental management system. It tells us that how and what should be the approach and it also gives us

certain numbers and values which should be followed if we are trying to do appropriate implementation of that particular ISO system under environment management system. And EMS is developed in compliance with the ISO 14,001 standard as a part of the organizational strategy to implement these environmental policy and to address the government regulation.

Like many other countries, in India, also we have various environmental regulations rule. And also we have a tribunal National Green Tribunal. I am sure most of you are heard about that. We call it in brief NGD; a very powerful authority to protect our environment. And EMS approach also incorporates the periodic review by top management and emphasizes continuous improvement instead of emergency management or crisis management. It means because of suppose our continuous utilization or extraction of certain natural resources from the ecosystem, if there is a negative impact on the environment suddenly happens and we go that and manage that kind of a emergency purpose, that is not the objective of EMS.

What we need to do is that we need to have a consistent review of the process, so, that, that kind of emergency situation should not even arrive. So, in a sense, prevention is better than cure. So, we need to be prepared through consistent review, evaluation of the system, because we know that natural resources we will be needing we will be continuously using it, but how, when and how much that needs to be actually reviewed. And accordingly the system should be managed.

(Refer Slide Time: 05:32)



Now, EMS as I said that it follows certain ISO standard like ISO 14,001 is a very standard model of (environment) improvement, ISO 14,001 follows the Plan, Do Check Act, we call it

PDCA model plan. You plan your action you do or carry out, you cross check that how it is working if there is any fault act implement.

So, this PDCA model of improvement under ISO 14,001 is very important for appropriate environment management and so, natural resource management. It is a kind of a iterative or repeating process, which must be applied regularly to ensure the benefits are being realized and also at the same time the standard is maintained.

Now, let us see how these PDCA model in a work what are the various aspects of this plan, Do Check an Act Model. Plan; what you do here you actually look at the various environmental aspects associated with any act or any activity that you are carrying out in a particular locality.

You also look at the various legal angles associated with that. Say for example, coal; coal is a very important natural resource and suppose, in your locality, there is a coal mine and coal mining is going on, we all know that coal mining should not be continued beyond a certain limit, there are several aspects of environment concerns are there and then of course, the safety issues related with land and various other aspects. So, we must see and follow the rules associated with also the mining process.

You know I just taken act example of mining, but it can be applied for various other aspects of natural resource management. Then comes your objectives, your targets and programs, say for the example of mines I have given. So, you have a target, any mining company will have a target that how much need to be extracted from the ground, but this all should be planned in accordance with certain standard to keep our environment safe so that the human life and the ecosystem does not come under any kind of danger. Once plan is done, then you go for doing it, what are the things and how you do that, see all the resources that you have at your disposal, you should utilize them responsibly. I mentioned it at the very beginning of this course, that responsible utilization of natural resources is one of the key aspect of an efficient natural resource management regime.

Now, authority when say some government departments, some organizations who suppose own mining area or a mine, they also will have certain amount of responsibility, because it is their duty to see to implement the certain aspects associated with environment management.

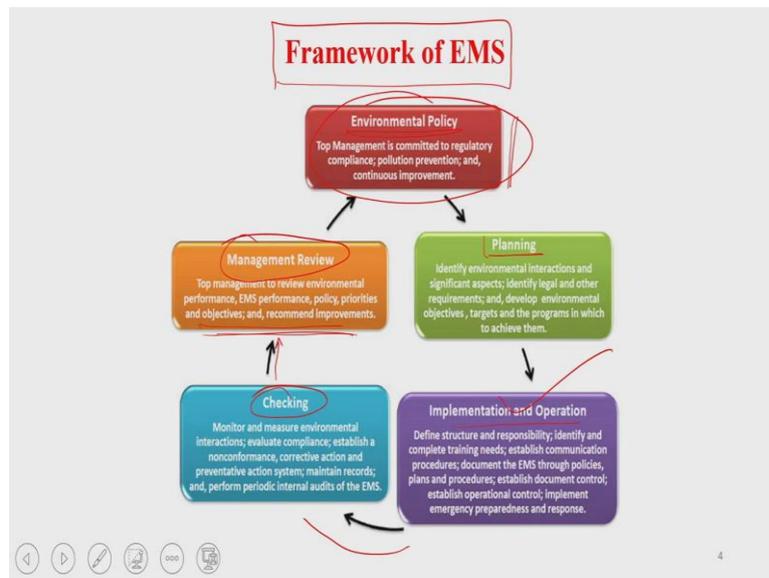
System competence, training, awareness of course, is very important and these all those things you will be actually doing during your actual ground work communication,

documentation, periodical review report and different kinds of leaflet control of documents, operational control, and emergency preparedness and response. So, these are some of the points; activities that will come in the second step; do of PDCA model,

Then comes the next step; check. So, once you carry out these set of activities, then you go and check your system, how it work, and that you do through a continuous monitoring, evaluation measurement. Then, you try to find out any kind of nonconformity, corrective actions, preventive measures that you take and control of records, internal audits. These are some of the important aspects which come under check step of PDCA model.

And then finally comes Act means this is the step of action. So, there you actually carry out a management review of the entire system and activity and you see that how much your all this planning, doing and checking exercises finally help you to implement the ISO 14,001 system or any ISO standard system as approved by any government of a particular area has been implemented appropriately.

(Refer Slide Time: 10:48)



Now, let us look at the framework of EMS environmental management system. It has certain component; on the basis of those components, EMS works in any ecosystem. What are those? Environment policies, any location or place or country or state will have certain policies associated with environment. When any company organization or group comes to work in any locality, the top management or authority of that particular group or organization is supposed to be responsible, committed to the regulatory compliance of the set of rules for proper environment management. Those actually include all kinds of pollution prevention,

different kinds of measurements to reduce the pollution, continuous improvement evaluation of the system, as I just discussed in the previous slide.

So, once you have this kind of policy on the basis of that, within EMS framework, one has to do a planning, where you actually will identify the environmental interactions, then identify the legality legal aspects and other requirements associated with that, then you develop environmental objectives, which are the things that you would like to do in a particular area, because location to location the type of natural resource utilizations will be different. So, on that basis certain strategies will also differ from place A to place B. So, then you have targets and the programs in through which you actually try to achieve the goal.

The goal is to have a sustainable environment management system in place after planning. Then you go for implementation and operation. In case of implementation operation as we discussed in the previous slide, you actually define those structure and responsibility of each individuals and each individual organizations responsible for that particular task, you establish a communication network procedures; how to communicate between each layer of responsible people and authority document them carry out, awareness program, establish different kinds of operational control, and then implement emergency preparedness, plan of actions and response.

Once this is done, then you go for checking as we discussed in the previous slide, where you carry out largely the monitoring and evaluation aspect to check that how much actually it is following the standard that has been set at the first level. Once the checking is done, and then you find that if there is any kind of gaps or any kind of corrections, that could be carried out, you have to carry out that before you reach to the final, review stage where top management will review the entire environmental performance.

So, before reaching that, during this process checking, you can have minor corrections. So, in management review, certainly, it is kind of, a kind of overall monitoring or evaluation of the status of implementation of an EMS in an ecosystem and that could be any kind of system; farming ecosystem, wetland ecosystem. So, any kind of forest so, that is how you basically implement try to implement the EMS in a particular area.

(Refer Slide Time: 14:34)

Benefits of an EMS

- *Improved environmental performance*
- *Enhanced compliance*
- *Pollution prevention*
- *Resource conservation*
- *New customers/markets*
- *Increased efficiency/reduced costs*
- *Enhanced employee morale*
- *Enhanced image with public, regulators, lenders, investors*
- *Employee awareness of environmental issues and responsibilities*

5

Now, what are the uses or benefits of having environmental monitoring system and how actually they help in efficient natural resource management? As I said at the beginning, that environment management system, though there, the word natural resources is not mentioned. But remember that when we talk about EMS, it has a direct link or implication on natural resource management as well.

So, let us see that what the benefits of an environmental management system are. It helps improving the environmental performance overall performance of any kind of ecosystem that we talk about it enhances the compliance of the system towards a standard here; we talk about ISO 14,001 Pollution Prevention, then Resource conservation.

New customers and market analysis, because that will give you the extra future demand that might come in a particular ecosystem. Increase efficiency and reducing cost of course, if you increase efficiency, your cost of managing the system expected to be going down.

Enhanced employee model. So, that is something, you cannot create in a day or month or so, but it is a responsibility of the EMS system to look at also, Enhanced morale of the employee who are working within that particular ecosystem, Enhanced image with public regulators investors, because these are the people who are the key players in that ecosystem where you are working.

Then comes Employee awareness about environmental issues and responsibilities. Often you will find that in some of the organizations who are actually responsible for environmental management, they themselves are not aware about certain issues and aspect about environment. So, it is critically important that the individuals working in these kind of

systems are well aware of the issues and they should also be made aware about their responsibility.

Now significance of Environment Management System in countries like India or any other developing countries.

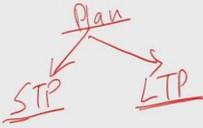
(Refer Slide Time: 17:08)

Significance of EMS in developing countries

- Although EMS have been introduced in developing nations, the concept of 'management' is very poor because it is not really management, rather responses to the environmental problems and crises as they arise.
- So there is a need to improve and understand the significance of EMS especially in a developing nations as these nations are still improving and developing their economy and cannot afford any environmental risks.
- Also, the developing nations are at a chance of greater environmental risks as these nations are where industrialization and developmental projects are going on at the most.

Thus, the effectiveness and significance of EMS can be understood under the following points:

- (a) selection of advisors, consultants and/or experts;
- (b) assessment of the current environmental situation;
- (c) development of realistic short-term and long range plans; and
- (d) implementation and enforcement of potential solutions.



6

(a) Selection of advisors, consultants and/or experts

- The effectiveness of an environmental management program is often closely related to the quality and resourcefulness of human input in assessment, planning, implementation and enforcement.
- Developing countries often require external expertise is needed and is made available through consultants, advisors and/or experts from other countries, generally from industrial countries in Western Europe, the United States, Russia or Japan.
- Although internal expertise is present at times but developmental agencies prefer external expertise most of the time for their management.
- The selection criteria should include factors such as the consultant's language skills, experience and success in related assignments, sincerity in assisting the host country, and sensitivity to and willingness to determine the social, economic, educational and political realities of the host country.
- Having an external consultant does not necessarily mean the success of the plan as it depends on the resources and information he is exposed to as often due to "upper" pressure information is not released or shared completely leading to a faulty management strategy that will hamper instead of benefitting the country.
- Also, the external consultant should not have any prior opinion or agenda before taking the project.



7

(b) Assessment of the current environmental situation

A comprehensive assessment prior to development of any plan of action is made. The team along with the external consultant, looks into some aspects before recommending any plan or action or solutions:

- (a) The current status of environmental quality;
- (b) The governmental infrastructure for regulation, monitoring and enforcement;
- (c) The availability of public and industrial funds for design studies and pollution abatement facilities;
- (d) The availability of trained or trainable personnel to design, construct and effectively operate and maintain facilities;
- (e) The support of the people and government for environmental quality control in view of direct and indirect costs of corrective programs.

8

It is bit different, in developing countries and developed countries for various reasons. So, let us see that how EMS is important in developing countries like India.

EMS have been introduced in developing nations, but the concept of management is very poor because it is not really management rather, it is kind of a responses to the environmental problem and somehow it takes care of the problem, when it arises then it is being addressed.

So, in developing country EMS Environment Management System is responsive kind of or reactive kind of work is being carried out. So, the principle of management at times is missing there. So, that is one aspect that we need to, enhance more in EMS framework, the management aspect.

So, there is a need to improve and understand the importance and significance of Environment Management System, especially countries like us, where the economy is still growing and growing at a very high pace. So, we cannot afford any kind of, environmental risk, because that would be very, disastrous for not only our environment, but also the development growth path that we are following. So, for the betterment of our own growth, it is important that we try to apply the Environment Management System in an appropriate manner.

So, the management part which is little weak a poorer, still in many parts of our country, that needs to be taken care of, also, you will find that the developing countries are at a chance of, greater environmental risks for various reason, probably for our geographical locations, et cetera. I am talking about almost all the developing countries. So, they are also having some

natural exposed to natural risk and these nations are where the industrialization and developmental projects are going on at the most.

So, you see that the countries are already having certain inherent environmental risk, but, these developing countries are actually at the, path of very speedy development growth. Industrialization is taking place various kinds of infrastructure development, so, the inherent risk or intrinsic risk plus this rate of growth. So, they are of course, there is a chance of more risk in those kinds of areas. So, we must have a very robust EMS system, so, that our own design development growth is not hampered, because of this kind of risk, which are already there in the system plus because of this fast in a plan of growth so, then the thing is that, we are actually at the threshold that we need to take care of our EMS in a very effective manner, as I again I repeat the management part of EMS needs to be strengthened.

EMS significance of EMS in our society, it actually needs to be understood very clearly. And to do that, we need to do, some kind of initiative and some kinds of activities planned in our society and ecosystem selection of advisors, consultants and experts is one way to do that assessment of the current environmental situation, this also will tell you the effectiveness of significance of EMS development of realistic short term and long term plan.

So, you have two sets of plan in hand; plan, which actually, you can easily address within a very short period of time short term plan and another, is long term goal. So, these two things need to be taken care of, and then implementation and enforcement of potential solutions.

So, even if you identify certain potential solution, the important matter is that, how do you implement that, and also enforce that solution into the system that you are working with. Now, this selection of advisors and consultants and experts is a critical step. And this has to be done with a lot of care.

The selection criteria should include various factors, such as the consultant's language skills, his experience and knowledge, sincerity, etc. And his knowledge about the particular area, the location and also the person expert or advisor should not be having any kind of bias or kind of, prior opinion on agenda before getting into this kind of project or work.

Then next, this assessment of the current environmental situation is also, can tell you the efficiency or effectiveness of your EMS system. So, a comprehensive assessment prior to the development of any plan need to be made, and the team along with the external and advisor

or consultant, they should look some aspect before recommending any plan or action for the solution. So, I go back.

So, here I was talking about that this is the some way that you can actually understand the effectiveness and significance of EMS, and here we are talking one by one that how actually, you can carry out these exercises.

So, assessment of current environment situation is very, very important, what actually you have to do. We have to do the study of our current status of our environment quality that will be our baseline, then we should look at the governmental infrastructure for various regulations monitoring enforcement, because we did that government setup, many things will be taking place. So, we need to also understand that very carefully.

Availability of public and industrial funds that need to be utilized for various activity because that idea will give you that how you design your course of actions and also different other activities associated with environmental management. Next, the availability of trained or trainable personnel to plan design constructs and effectively carry out this action.

This is where often we find at the field level, you will find the challenge. At the proper time to find a skilled person for a particular work, you will see will not find that and that is why many times this kind of work related with natural resource management, environment management system get badly affected.

So, we need to have a pool of trained skilled personnel. For that, the preparation should start long back and it should be a continuous process, process of skill development for natural resource management environment management system should be a continuous process.

So, that when the need arises, you have a set of people who can actually carry out the work. The support of the society, the people, the government is very important for maintaining environment quality to manage the natural resources of any ecosystem, because without the people support, we cannot carry out a very effective or efficient environment management system and so, the natural resource management system.

(Refer Slide Time: 25:40)

(c) Development of realistic short-term and long range plans

- Thorough studies and well- conceived short-term and long-range plans are necessary for orderly and efficient approach towards planning.
- For plans to have meaning and value, they must be realistic and implementable. They must be based on social, economic, educational and political realities of the country.
- The success of such plans are determined by their relevance and appropriateness to the realities of the host country.
- Often plans are used (or abused) by politicians and/or by industry in developing countries (and in industrialized countries) as 'instruments of delay'. The unsuspecting public sector are led to believe that the solution is close at hand because of these plans. The problem can only be solved by their implementation.

Next development of realistic short term and long term plans. Very important, as I said that we should have in one hand short term plan which we can finish suppose within few months a year or so, and then we have a long term plan couple of years. So, these two set of plan should be a envisaged, prepared through consolidated studies.

So, once these kinds of plans are kind of ready and it is ready in your hand then to carry out a very efficient EMS or NRM will be very, very easy. So, plans to have a value for the society for that particular ecosystem where you are working, they must be based on realistic and implementable ideas.

So, we must know the place and the area and then think about certain realistic target; real and implementable ideas and they must not be based on some other assumption, and that is why consolidated study and knowledge about an area is very important. So, these plans, they must be based on social, economic, educational and political realities of the country of the area, where you are working.

And the success of such plans will be determined by their relevance and appropriateness to the real condition of the ground. So, if your conceived idea or plan is made sitting far away from the area where actually the plan will be implemented, I am sorry, there is a high chance that the plan will fail.

So, we must be very realistic and our plan whether short term or long term, it must be based on the real grounds situation.

Often plans are used or abused can say by, politicians stakeholders, different people from industry, in developing countries and sometime also in developed countries. So, what happened is that sometime these initiatives, activities get delayed for some unknown reason. Now, the unsuspecting public sector are often led to believe that the solution is close at hand because of these plans, but the problem can only be solved by their implementation, not by the planning, not by hiring consultations only, but the problem can only be solved by their proper implementation on the ground.

And this fact is true for any country across the world developing or developed world. So, this is also an aspect because we are working with all natural resource management specialists will be working in this society only. So, we must be aware of this real fact and accordingly devise the course of actions so that your process implementation process or actions is not delayed due to some other external factors.

(Refer Slide Time: 29:02)

(d) Implementation and enforcement of potential solutions

Once all studies and planning is done, it is time to implement the best suited strategies for environmental management. This is achieved by:

- (a) Minimizing pollutant production by process control in industry and by consumer efficiency in the public sector and/or by
- (b) The use of 'end-of-pipe' technologies to modify, reduce in volume, or better distribute in the environment contaminants that have been generated. End-of-pipe technologies range from simple retention basins for wastewaters to electrostatic precipitation for air emission control etc.

In recent years the concept of **'appropriate technology'** is widely discussed. The need for new and novel appropriate technologies is not as important, however, as the **'appropriate use'** of existing technologies.

Here again consultants who are sensitive and aware to prevailing economic conditions in a developing country can propose alternative treatment technologies that are effective but low in cost and easily operated and maintained.

10

Next, implementation and enforcement of potential solution exactly. This is what I just discussed in the previous point, once your planning is done, it is the time for implementing it and this is the most critical step. So, you will find that in recent years, the concept of appropriate technology is often discussed in various forums, appropriate technology.

So, the need for new and novel appropriate technology is not as important however, the appropriate use of existing technology could be very, very important, I repeat it, the need for new and novel appropriate technology may not be as important when you compare with the appropriate use of the existing technology.

So, we have, we have certain amount of technology any society, even including the indigenous technologists, with the community. So, it is important to see that the appropriate use of those technologies which are already in the shelf with us is being carried out. Of course, appropriate technology off the shelf is equal important and for that research and innovation need to be carried out.

(Refer Slide Time: 30:25)

Trends in EMS in India

- Indian economy is relatively young. Industrialization started properly after independence.
- Indian government has adopted ISO14000 for promoting worldwide standardization to facilitate international commerce.
- Many environmental laws have been enacted since 1964 along with creation of regulatory agencies to implement these laws.
- However, the command and control (C & C) approach which represents the traditional form of governance largely adopted in India has failed to reduce industrial pollution
- Environmental reporting by Indian corporations lags significantly behind. It is still in its infancy. The reason is probably less pressure applied to Indian companies by stakeholders, environmental groups, the general public and importantly the government.
- To motivate the companies for meaningful environmental reporting, rewards for good quality of environmental reporting should be instituted, similar to the rewards for good environmental performance.

11

So, next is Trends in EMS in India. So, if you look at that environment, monitoring systems and its trends in our country, you will find that Indian economy is relatively young and our industrialization has started in a proper manner only after independence. Our government has adopted ISO 14,000 for promoting worldwide standardization to facilitate international commerce.

Now, this standardization as that it has enormous importance in the acceptance of certain industry standard. Many environmental laws have been enacted since 1964, along with creation of regulatory agencies to implement these kinds of law.

However, the command and control which we call C and C, this command and control approach which represents the traditional form of governance that has been adopted in our country has somehow not been successful in reducing the industrial pollution. Now, there are various reasons for that perhaps most of you might know, if you are following print and television and other kinds of media.

Environmental reporting by Indian corporations also lags significantly behind, the corporations in developed countries. It is still in infancy, there are various reason for this

probably, less pressure applied via Indian companies, by the stakeholders. So, our stakeholders need to become more proactive, and these companies should be answerable to some of the queries generated by stakeholders, environmental groups, general public and importantly government.

So, this kind of system need to be in place then EMS is also important to motivate the companies for meaningful environmental reporting, rewards for good quality of environmental reporting should be instituted and similar in line of rewards for good environmental performance by a company organization.

Now, this kind of thinking and process need to be more frequent visible, so that every individual companies or corporate industries, they automatically take this kind of system, blend it with their already existing different kind of management system within their organization. EMS should not be a kind of a standard and management system within organization or industry or company. So, that needs to be ensured.

(Refer Slide Time: 33:09)

Environmental initiatives in India

- National Council of Environmental Policy and Planning was set up in 1972 which was later evolved to Ministry of Environment and Forests (MoEF) in 1985 and finally to Ministry of Environment, Forest and Climate Change (MoEFCC) IN 2014.
- CPCBs and SPCBs
- The Policy Statement for Abatement of Pollution and the National Conservation Strategy and Policy Statement on Environment and Development were brought out by MoEF in 1992.
- The Environmental Action Programme (EAP) formulated in 1993 to improve environmental services and integrating environmental considerations into development programmes.
- NGOs.
- As per IPC, Articles 268, 277, 278, 290, 291, 46, 130, 431 and 432 are related with different aspects of environment.
- Formulation of National Environmental Policy (NEP) IN 2006.
- Indian Green Building Council in 2001 to adopt eco-friendly concepts to Indian industry.

12

If you look at the various environmental initiatives in India, our National Council of Environmental Policy and Planning which was set up in 1972, which was later evolved to Ministry of Environment and Forest or MoEF in 1985 and finally to Ministry of Environment forests and climate change recently in 2014.

Under various initiatives, there are also CPCB's and SPCB's has been created center pollution control board state pollution control board, then the policy statement for Abatement of pollution and the National Conservation Strategy and Policy Statement on Environment and

Development were also brought out by MoEF in 1992, the Environmental Action Program EAP, another very important initiative formulated.

In 1993 to improve environmental services and integrating environmental considerations into development paradigm of programmes. NGOs working in the field of environment did come up one as one of the, conscious effort of the government, as per IPC articles 268, 277 and et cetera, as mentioned here, these are all related with different aspects of environment and also been looked into and formulated.

Formulation of national environmental policy or NEP in 2006 is another very important achievement or as a milestone under environmental initiatives in India.

Indian Green Building Council in developed in 2001 to adapt eco friendly concepts to Indian industry. this Indian Green Building Council is very, very important, especially nowadays when most of the cities the metro cities are coming up with, huge number of buildings, office buildings, and then houses. So, this Indian Green Building Council or IGBC is developed in 2001 is actually responsible for managing these buildings in the line of, keeping our environment benign.