

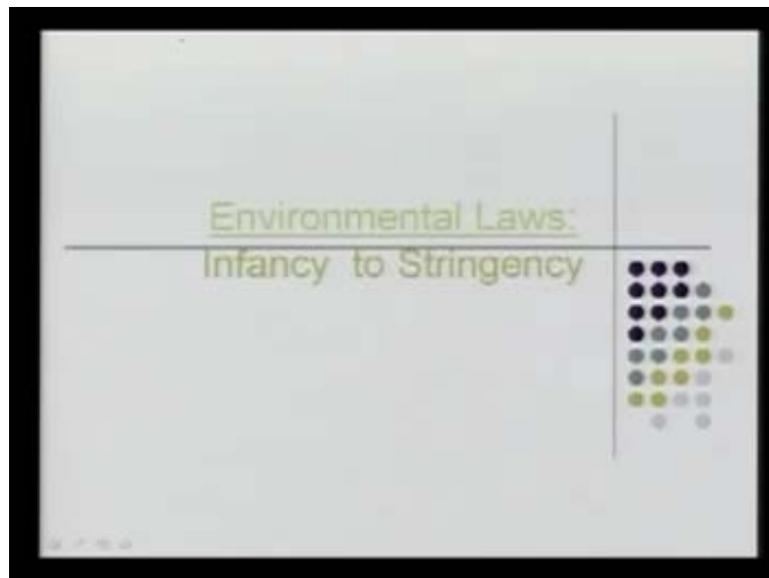
**Environmental Air Pollution**  
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**Lecture No. 39**

**Environmental Laws**

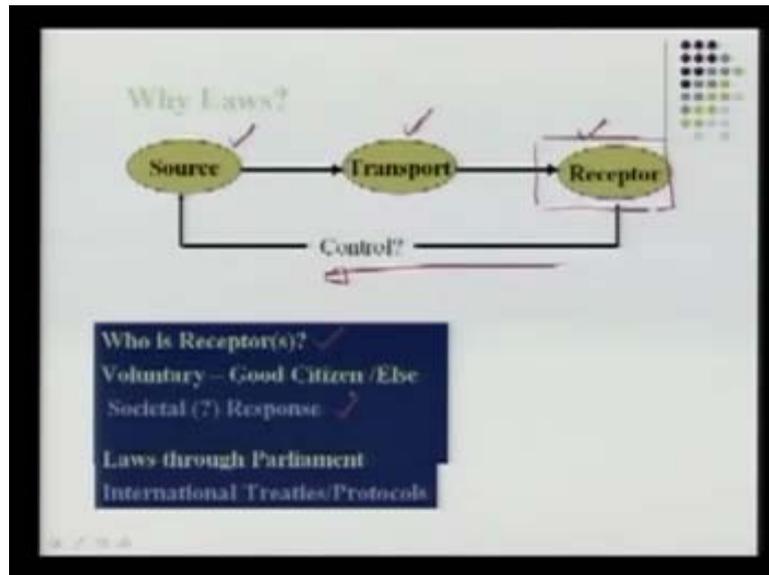
Today, we will talk about environmental laws.

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Environmental laws were started some 30–35 years ago and with time, they have become very stringent and cover almost all aspects of our life. We have both a responsibility towards environmental laws – an obligation – as well as certain rights. We will go through the journey, which is basically a historical perspective of today's conditions and what situation is there for environmental laws – we will discuss that. The title is ‘infancy to stringency’.

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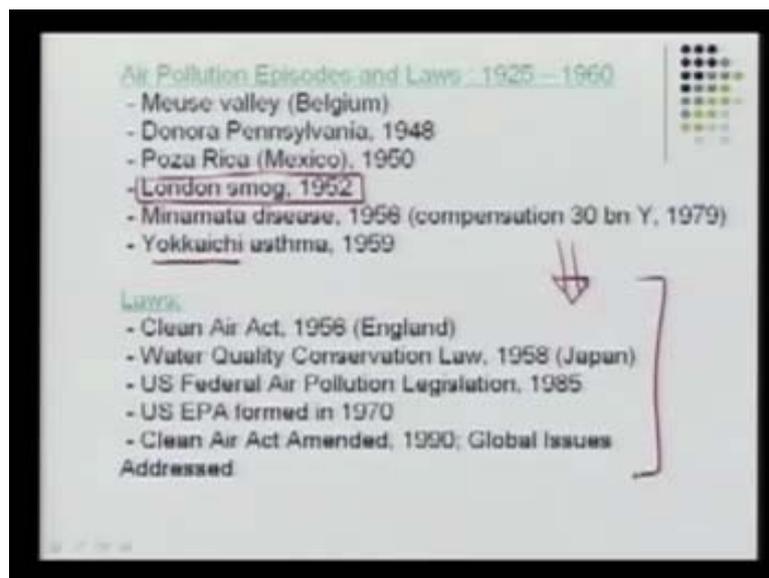
If you look at the first slide, the question comes up as to why we need laws. When we understand the system of environmental pollution or environmental propagation or pollution transport of the pollution, we can say that three things are happening: there is a source, there is a transport mechanism – whether it could be water pollution or air pollution does not matter, pollutants are transported through the medium – and there is a receptor. What I mean by the receptor is the people, the ecology that is affected. There are three components of an environmental system. It could be water pollution, air pollution, soil pollution, noise pollution but there would be three components. Source is transport of the pollutants and it affects. When the effect is so severe, the people tend to suffer because of pollution and we need to do control and that is the direction of the control. Where is it controlled?

For example, if an industry is causing pollution, the industry must control the pollution. But sometimes, saying is not enough – we may ask the industry to control but there have to be certain rules and regulations so that the industry is duty bound to control the pollution. So we define what is the receptor – it could be the ecology and the people. When do we not need the laws? For example, if the industry or the citizens or the people running the industry or running other pollution activities voluntarily control the pollution on their own, then we do not need so many laws. But obviously, certain laws are required for pollution control and they have come through societal response as the society tends to ask for more and more pollution control and then the environmental laws become a very important component of legal enforcement.

So laws are through the Parliament – that we can see. Our Parliament will make the laws and there will be a system or there will be a body, there will be a mechanism to implement the laws. In addition, the laws can be the national laws – we will see some of them, there could be international laws that we have to follow and there could be treaties between two countries or there could be treaties amongst many countries or several countries and then there could be protocols that we need to follow. We will go through this journey in this lecture.

We move to the next slide and look at the perspective I mean why suddenly there was a need for environmental laws. If you look at history, air pollution episodes have been reported; for example, suddenly because of poor weather conditions, dispersion is poor, there have been many episodes that cause very high level of pollution and that resulted in several deaths and injury and there could be some accidents as well.

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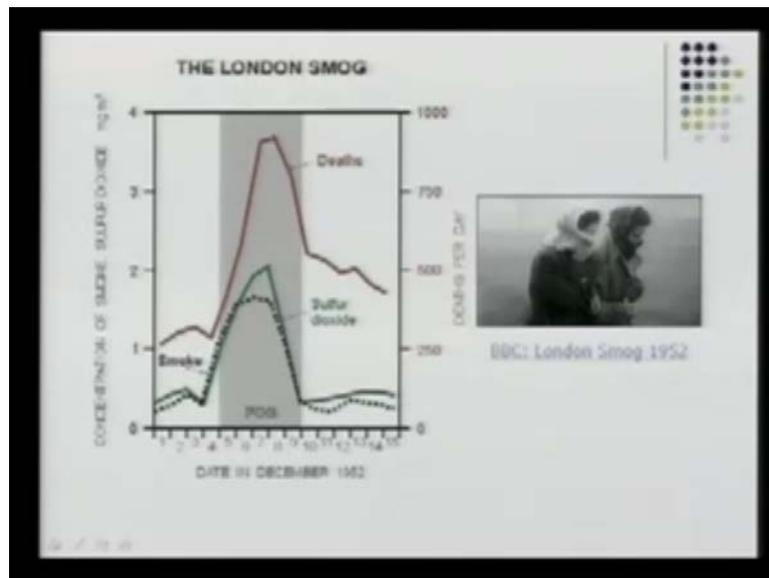


There are little examples I am giving here: Meuse Valley (Belgium), Donora in Pennsylvania in 1948, Poza Rica in Mexico in 1950, London smog, very famous, I will discuss about this a little bit, it was in 1952 – several thousand people died because of the pollution problem in 1952, serious problem. Similarly, in Japan in 1956, there was pollution because of the methyl mercury pollution in Minamata Bay, resulting in severe injuries and damage as well as deaths – that was in 1956. Again, as the industries were growing in Japan in 1959, many people suffered from asthma and in fact, that asthma become famous and got the name Yokkaichi asthma – Yokkaichi is a city in Japan. Obviously if such a situation exists, we need to control

pollution because the basic fundamental requirement or fundamental objective or the fundamental purpose for pollution control engineers is to provide good and better public health to the people.

The second thing you are seeing here on the screen – these were mostly the responses to the environmental problems. What were the responses? People tend to form the regulations. For example, the Clean Air Act was in response to the 1952 London smog, Water Quality Conservation Law came in Japan in 1958, US Federal Air Pollution Legislation came in 1985, US EPA, a very important agency that does a lot of research and makes environmental laws was formed in the United States in 1970 and also in the US again, the Clean Air Act in United States was amended in 1990 to account for pollution control, even for other toxic compounds. So with this little history, we see that mankind has been responding, the governments have been responding to pollution. This was a little history of what has happened in certain countries in the world.

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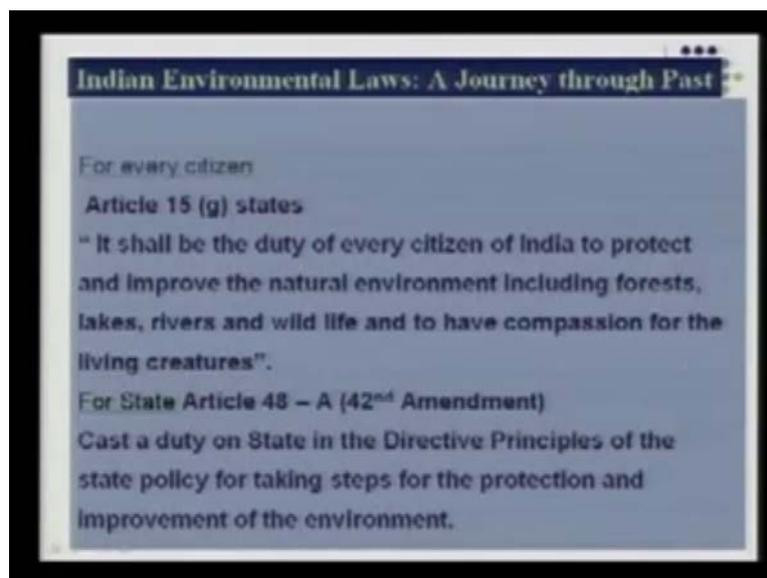


But let us see what exactly had happened in the London smog. You see a picture in your screen. It was during the month of early week of December, that was in 1952. Suddenly during the 3<sup>rd</sup> or 4<sup>th</sup> of December, the pollution started rising, you can see the green line or the green graph – that was the sulfur dioxide as you can see here (Refer Slide Time: 06:49). So suddenly in London, sulfur dioxide started going up, so was the smoke – the dot you see here – and the levels of both of them **as you see...** this is the side screen (Refer Slide Time:

06:59), at the peak time, it was 2 milligram per meter cube of sulfur dioxide, which is very very high and it started affecting the people, the red line you see is the number of deaths and number of death is given on this side (Refer Slide Time: 07:16).

There this was the normal death rate per day in the London city and then because of the pollution, people started suffering and it caused death apart from injuries. This is the picture taken from the London smog from the BBC site. You can imagine how pollution can cause very serious problem. So we need to control and we have to have a legal system that would be enforced, industries need to follow and individual people have to follow, the vehicle owners have to follow – how to keep their vehicles clean. These things become very important, so this lecture today is for environmental laws. Let us see the environmental laws in India. Then we will discuss a journey through the past and what are the laws that we have today.

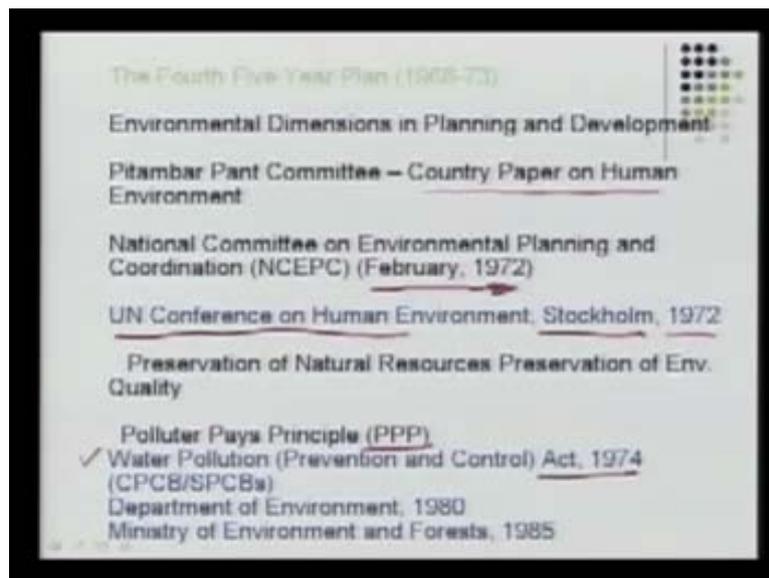
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In the constitution, every citizen needs to do **certain...** they are duty bound to do certain things as per the Article 15 (g) that states for citizens of India “It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wild life and to have compassion for the living creatures.” We all are duty bound to keep the environment clean. It is not only that every citizen is duty bound but the constitution also casts a duty on the states. The Article 48 – A, which was the 42<sup>nd</sup> Amendment, casts a duty on every state in the Directive Principles of our constitution the state policy for taking the

steps for the protection and the improvement of the environment. The states also need to do everything it takes to clean up the environment for better public health and better living, which is in unison with environmental conditions. How did the government act on the whole thing? In the 4<sup>th</sup> Five Year Plan for the first time, environmental pollution was talked about in India.

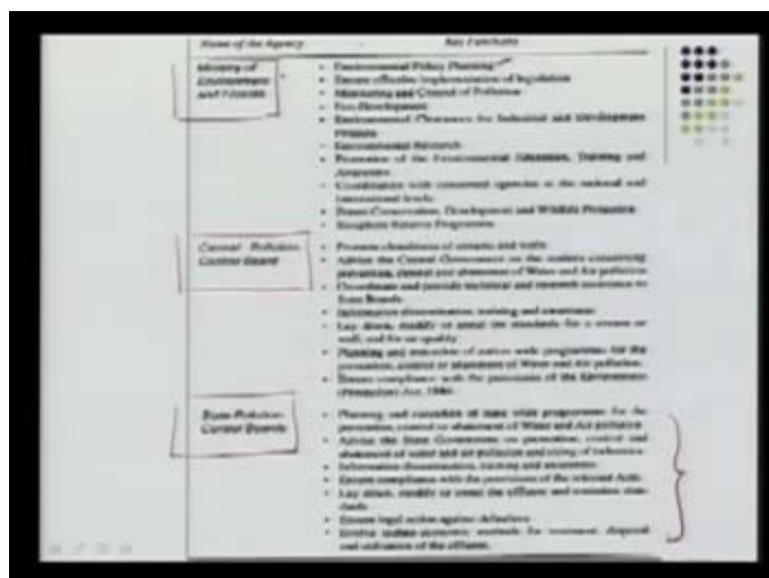
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The environmental dimensions in planning and development were considered. We cannot leave the environment alone and so in the planning process and the development process, the environment should come. During the same period, the Pitambar Pant Committee was formed to prepare India's Country Paper on human health as I have written here and you can see on the screen. After that, a committee was formed – it was a very important committee when it comes to devising and developing environmental laws in the country. It was the National Committee on Environmental Planning and Coordination that was formed in 1972. A very historical conference was held where the state heads of many countries participated and then discussed as to how all over the world environmental protection should become a law and how to go about this. So an extremely important conference was held called the UN Conference on Human Environment and that was held in Stockholm in Sweden in 1972. The basic thing that came out from that conference was preservation of natural resources and preservation of environmental quality – both the resources as well as the quality.

The interesting thing that came out from this conference was interestingly known as PPP principle or it is called the Polluter Pays Principle. If you are polluting, how many you have got to pay for it? You cannot get away scot-free by polluting; you need to do something about this. In fact, it was as a follow-up of the Stockholm Conference that the Government of India, our government decided to enforce certain laws. The first law exclusively for environmental control came into being in 1974 and that act or the law was called Water Pollution (Prevention and Control) Act, 1974. In fact, under this provision of the law, State Pollution Control Boards and the Central Pollution Control Board were formed so that environmental laws can be implemented and we have a mechanism to implement the environmental laws – that was in 1980; the Department of Environment was formed and the work of the Department of Environment grew so much that in 1985, the Department of Environment was upgraded to a full-fledged ministry of the Government of India. This is a little brief history as to how the government institutions thought about environmental problems and how they acted. We will try to get into more specifics.

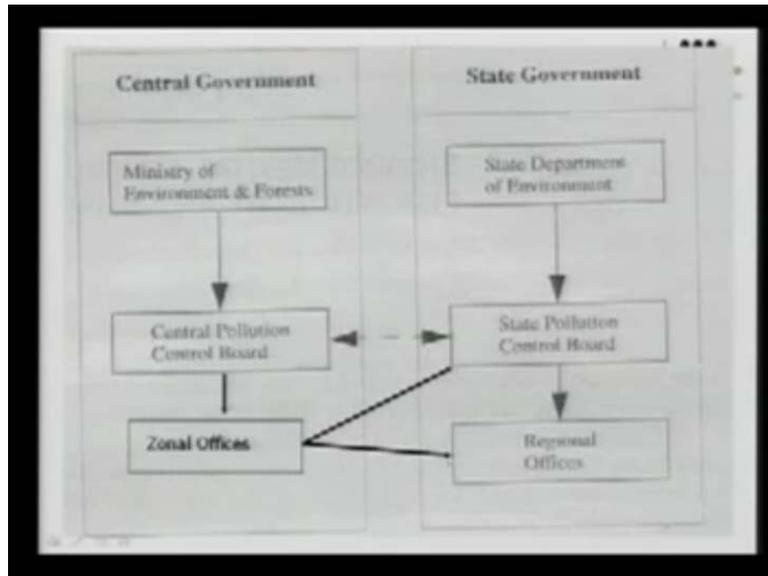
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There are three main bodies in the country that deal with environment and pollution and the environment in general. At the central government level, we have the Ministry Of Environment and Forests, again at the central level we have the Central Pollution Control Board and at the state, which implements the environmental law on pollution control, is a State Pollution Control Board. As you can see here, environmental policy planning is done at the at the central government level. The Central Pollution Control Board is an advisory

agency to the Government of India – you can see here as I am trying to underline – advises the central government on matters concerning prevention, control and abatement of water and air pollution. Similarly, the State Pollution Control Boards implement the laws in the state. Let us also quickly see what kind of mechanism these have.

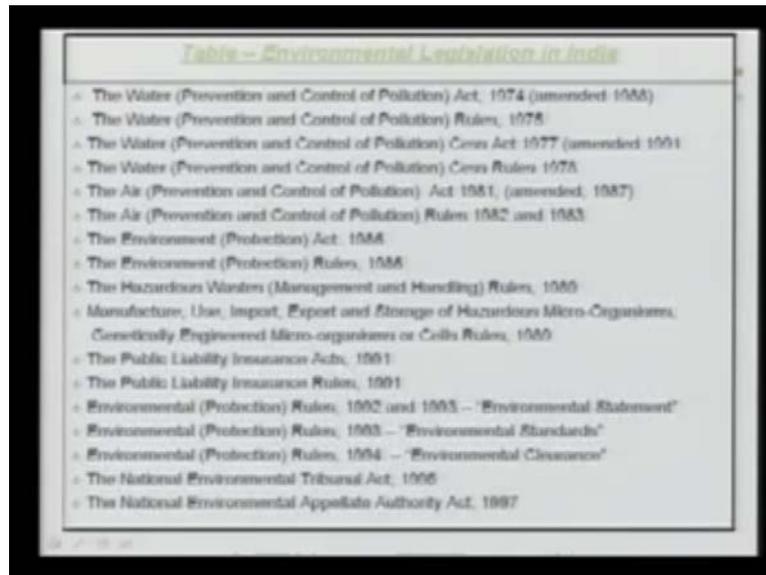
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These are the mechanisms for pollution control in India. We have the central government at the federal level, we have the state government at the state level. At the central government level, we have the Ministry of Environment and Forests. Under that, there are many agencies and many other organs the ministry has to deal with pollution but the important thing is the Central Pollution Control Board, which is concerned largely with pollution control because there are many aspects for the environment and pollution control is one of them.

The focus here is on pollution control. The Central Pollution Control Board is an advisory body for the Government of India. It also has its zonal offices spread all over the country. Similarly, at the level of the state government is the state department or the state Ministry Of Environment – that is here. It also has a State Pollution Control Board that interacts with the state-level ministry and it also has the regional offices as you can see here. The State Pollution Control Board and the Central Pollution Control Board have a very close link and they interact on environmental laws and implementation and enforcement of the laws. This is in very brief the mechanism of the enforcement of environmental laws concerning pollution control in the country.

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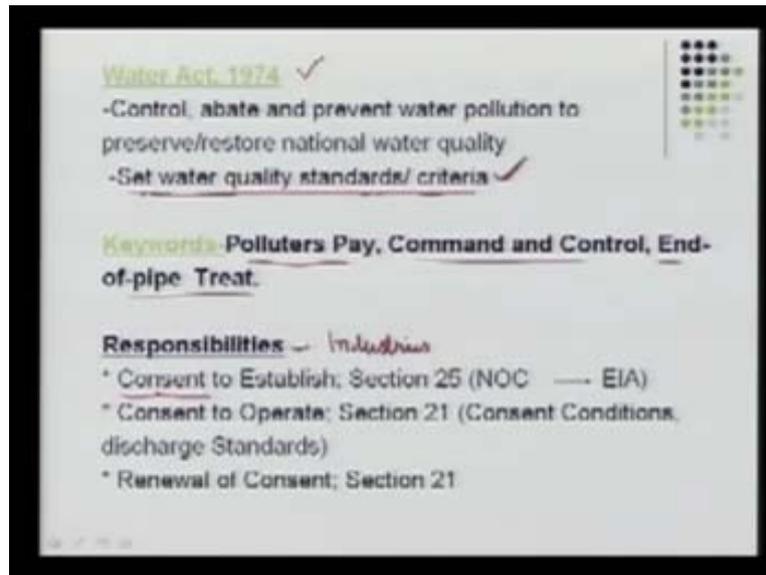


*Table - Environmental Legislation in India*

- The Water (Prevention and Control of Pollution) Act, 1974 (amended 1985)
- The Water (Prevention and Control of Pollution) Rules, 1975
- The Water (Prevention and Control of Pollution) Cess Act 1977 (amended 1991)
- The Water (Prevention and Control of Pollution) Cess Rules 1978
- The Air (Prevention and Control of Pollution) Act 1981, (amended, 1987)
- The Air (Prevention and Control of Pollution) Rules 1982 and 1983
- The Environment (Protection) Act, 1986
- The Environment (Protection) Rules, 1986
- The Hazardous Waste (Management and Handling) Rules, 1989
- Manufacture, Use, Import, Export and Storage of Hazardous Micro-Organisms, Genetically Engineered Micro-organisms or Cells Rules, 1989
- The Public Liability Insurance Act, 1991
- The Public Liability Insurance Rules, 1991
- Environmental (Protection) Rules, 1982 and 1983 - "Environmental Statement"
- Environmental (Protection) Rules, 1983 - "Environmental Standards"
- Environmental (Protection) Rules, 1984 - "Environmental Clearance"
- The National Environmental Tribunal Act, 1995
- The National Environmental Appellate Authority Act, 1987

Let us quickly go and see the many environmental laws that we need to understand and we need to follow – it could be an industrialist, it could be ordinary citizens using the environmental resources, there is a duty, there is a law for everyone. Probably, it is a little difficult to go through all the laws as you see on the screen but the first law or the act that came was in 1974 – that is called the Water Act or the Water (Prevention and Control of Pollution) Act that came into being in 1974. Some of the laws and rules we will discuss as we go by in this lecture and it will become more clear, but of course environmental laws is such a subject in itself that it is probably difficult to cover through one lecture, so briefly we will go over certain issues; these laws can be checked at the Web site of the ministry or of the Central Pollution Control Board if you need to go into the details.

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We will discuss a little bit about the Water Act that came in 1974. Essentially, it focused on control, abate and prevent water pollution and to preserve as well as restore the national water quality. One of the major objectives set in this Water Act, 1974 was to develop the water quality standards. What we mean by the water quality standards is the standards of the water quality in terms of various parameters, which should be what kind of water quality should be there in the rivers, the lakes, the groundwater and other environmental resources. The objective was to set the standards so that once we have the standard, then we can compare the things and decide what action needs be taken. Similarly, the keywords were Polluter Pays, Command and Control, End-of-pipe Treatment – those become the focus for all the industries. In fact even for the municipal supplies, wastewater is generated in each city and that needs to be controlled and why we call it the end-of-pipe treatment is that when it is discharged, when it is about to be discharged into the water body or on to the land, there must be some treatment done – that is called end-of-pipe treatment.

When we talk about responsibilities, the responsibility largely which I am referring here is to the industries – let us write that one. Every industry that is water polluting should obtain a consent – that is a very important word. Before even the industry is going to start the business, before they are even going to put the foundation stone, what is required is that they obtain a consent or in short form I can say a no-objection certificate that a industry can certainly come at the place where they intend. When they are getting such kind of NOC (as I have written here – no-objection certificate), they need to demonstrate that the kind of

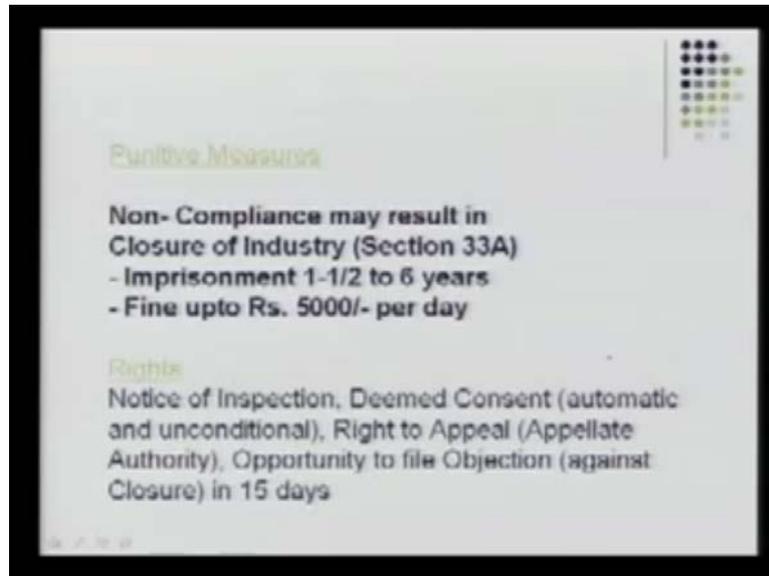
technology they have is a clean technology, they have to demonstrate the wastewater that would come out from the industry will be properly treated and it will not have adverse impact on the receiving water bodies. It is very important that even before the industry comes up they take a permission – they need to take a consent, that is right in the beginning before the industry comes up, it is a kind of guarantee that the industry will be will be an environmental-friendly industry; that is a very important step.

So legally, all the industries, all the people who are planning to have an industry, they should go to the proper authorities and provide enough information that industry is a green process and it will not cause any harmful impact on the receiving water bodies or receiving environment or to the people and then they can get a go-ahead and then they can start construction. Well, it does not end there because once the industry is ready, before the production can start, they must obtain another consent and that consent is called ‘Consent to Operate’ – that is under specified in a Section 21. When the industry goes asking for the consent to operate, essentially what the industry is saying is “Our industry is ready” or “We are about to start the production” or “We are about to start the operation of the industry”. In that case, they again need a consent or a permission from the government and the government can put or lay down certain conditions – those conditions are called the consent conditions, especially on the discharge standards as to how much is the water quantity that you can discharge and how much is the pollutant that can be allowed to discharge, because in certain cases it may be possible to have zero discharge or zero pollution but certain industries will be using a lot of water and zero discharge and zero pollution can be very very difficult sometimes, although one has to try every time to improve the situation.

This consent thing which I am trying to emphasize more and more is not just a one-time business – consent needs to be renewed every time within a certain time frame specified by the authorities so that there is a continuous improvement in the functioning of the industry as far as the pollution is concerned because the authorities can tighten the standards, the authorities can say ‘Improve certain things’ and that becomes a renewal mechanism for the consent that every it could be only to be renewed. It depends on the authorities whether it needs to be renewed for one year, three years, five years, ten years depending on what kind of situation the person or the industry is in. So you get an idea – the industry needs to take a consent or needs to take permission or needs to take an NOC (which stands for no-objection certification) and sometimes, even the NOC simply is not enough – they need to go for

something called EIA, which stands for Environmental Impact Assessment. That is in fact an even detailed study of the impacts of the pollutions or the emissions and other activities on the environment as a whole.

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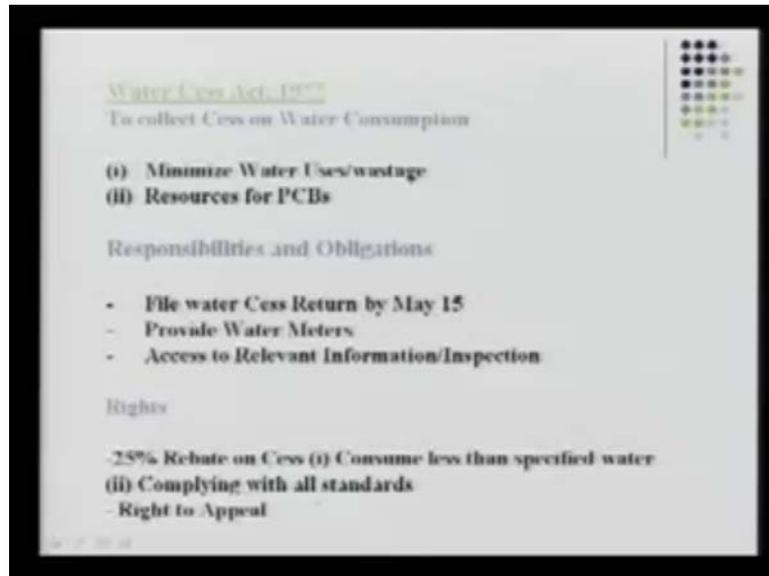


There are certain punitive measures we will be very briefly specifying. Non-compliance: suppose the government has given the consent and within the consent, there are certain conditions that the industry needs to follow and if they do not, then it can attract punitive action from the government and there could be certain punishments – they are incorporated in the law. Apart from that, it is simply not enough to say there are punitive measures, the industry also has certain rights and why not? These rights will include notice of inspection: suppose somebody wants to come and inspect for a formal inspection, then they need to take **certain...** the industry will need the information.

There is something called deemed consent – that is an important concept. Suppose the industry applies for a consent and within four months, there is no reply from the authorities, then the consent becomes automatic, it becomes a deemed consent and it becomes unconditional consent. The industry also has the right to appeal if it thinks proper justice is not done or the conditions have been very stringent or something cannot be justified – it can appeal to an appellate authority that is again created as per the provisions of the Water Act. Then, there is an opportunity for them to file the objection **against...** Suppose the industry is directed for closure, then they can go to the proper authority to say the closure is not quite

right or they can explain the situation and then proper action or no action can be taken as far as the closure is concerned. These are the mechanisms and ways in which the Water Pollution Act is being implemented in the country. We move on.

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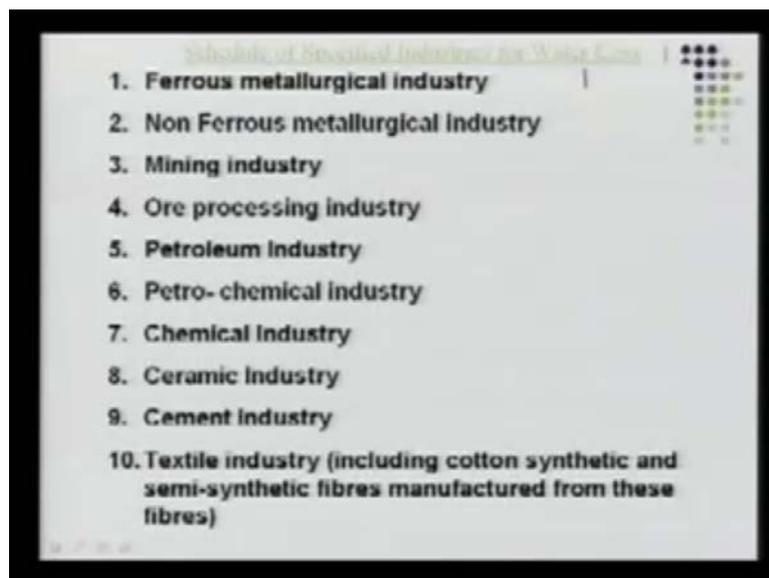
Similarly, there is another provision in the Water Cess Act – this act came in 1977 as you can see here. The purpose of the cess or the cess means here basically the say small levy or charge on the amount of the water consumed. Sometimes, there is a confusion as to whether it is water consumed or water or wastewater discharged. Here, we are talking of water uses, so the objective here is not to collect money but objective is that if you are charged certain money, you will try your best to conserve water –something like electricity, you pay for electricity, here also you are paying more and more for more and more water use, so automatically there will be a ways and means the industry or the person will think about how to how to minimize the water use; this also becomes an additional resource for the pollution control boards.

Responsibilities and obligations for the industry, let us write in the bracket industry. We need to file a return, file water cess return; we file a return for the income tax, similarly the industry needs to file a return on the water cess and for that, the deadline is May 15. They also need to provide the water meters so that we know exactly how much water is being consumed. Even if somebody is not using the water from the lakes or from the rivers, even if they are using the groundwater, the groundwater also comes in the ambit of the Water Cess

Act – you cannot say that you are not using the resources in terms of the river or lakes. Again, groundwater is not the sole authority, it is not the sole resource that you can use independently – groundwater is there for everyone to use, so even if somebody is using the groundwater, this comes under the ambit of the Water Cess Act.

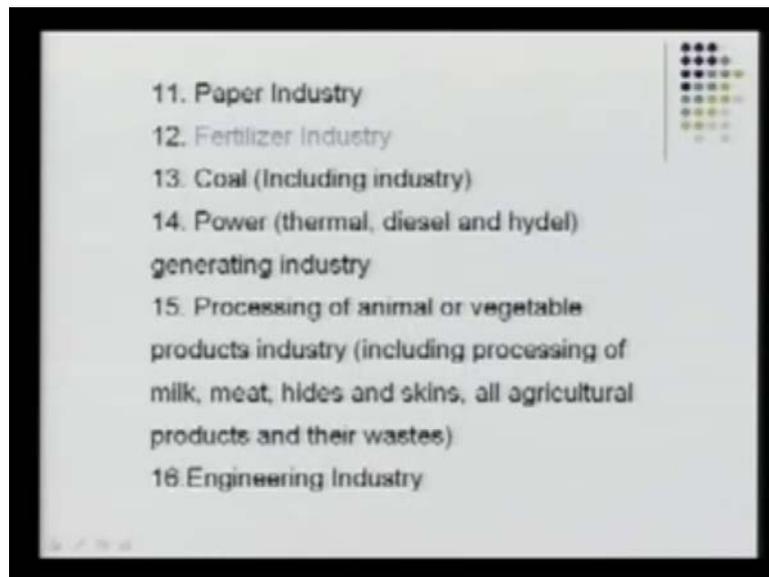
Access to relevant information and inspection: the authorities can ask for. Rights: rights for whom? Right, for the industry again, there is a 20 percent on cess when the industry consumes less than the specified water – there is a certain water quantity that has been specified and if the industry is using less than that, there could be a rebate of 25 percent; complying on all the standards: then also, they can get certain rebates; then if the industry feels there is some injustice or it has been wrongly charged when it came to the water cess or the water levy or the water tax, then they can make an appeal and get the redressal.

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Quickly to indicate as to what are the industries that come into the category of the Water Cess Act or where the Water Cess Act will be... In fact, all kinds of major industries as you can see as I put the arrow down, all the industries come under the Water Cess Act – so it could be ferrous industry, non-ferrous, mining or processing petroleum, petrochemicals, chemical industry, ceramic, cement, textile industries and in fact, this list is even bigger.

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Pulp and paper and then you can say **almost...** pretty much covers almost all kinds of industries.

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Prescribed Rate of Water Cess

Purpose for which water is consumed.	Rate of Cess under Sub-section(2) of Section 3	* Rate of Cess under Sub-section(2A) of Section 3
1 Industrial cooling, spraying in mines pits or boiler feeds	One and half paise per kilolitre	Two and one-fourth paise per kilolitre
2 Domestic purpose	Two paise per kilolitre	Three paise per kilolitre
3 Processing whereby water gets polluted and the pollutants are easily biodegradable	Four paise per kilolitre	Seven and half paise per kilolitre
4 Processing whereby water gets polluted and the pollutants are easily biodegradable and are toxic.	Five paise per kilolitre	Nine and a half paise per kilolitre

\* These rates shall be applicable only in case of non-compliance with any of the prescribed consent conditions or any of the standards for discharge of effluent prescribed by the Central Government under Environment (Protection) Act, 1986, otherwise, as specified under sub-section(2)

Quickly as to what kind of charges we are talking when it comes to the water cess. Here for example, depending on what is the purpose of water that has been **used...** as you can see here, the heading 'Purpose for which water is consumed' **....** Suppose the industrial **cooling...** In fact, cooling water generally does not get so much polluted. What really happens is that it is the temperature that goes up on the water. So for example, if you are using the cooling

water, the rate of cess will be one and a half paisa per kiloliter – that will get charged. The interesting part about law is that laws can keep on changing, so we have to keep abreast with the change in laws, we have to keep updated with the laws – it is not science but of course, science also changes with time, but laws can change very quickly. So for example, let us take this situation It is just an example to demonstrate certain things – not that we are trying to actually do the calculation or let us take the simple example here (Refer Slide Time: 29:043).

Suppose there is a steel plant and the capacity of the steel plant I write here capacity is let us say ten million ton annual capacity of steel production, so the capacity here 10 million ton per year and it is using water for cooling, let us say; it is just an example that I am generating for you, it is using 100 meter cube (meter cube is same as kiloliter) per ton of steel. The cess or the tax that the industry will pay will be equal to... for the cooling water, how much is it? One and a half paisa – in terms of rupees, it will be 0.015 times how much water are we using? 100 meter cube or hundred kiloliters per ton. How many tons they are making? 10 into 10 to the power 6 or a billion tons.

I will make this clear to indicate that this is actually 5 (Refer Slide Time: 30:38), so let us not get confused. This comes out to be... if we show the calculation, three digits will go away from here, so you have three, four, five, six, seven, so 15, this will in fact be nearly Rs. 1.5 five crore; it is a big amount, so the industry would rather make sure that it is using less and less water. So these are the charges or these are the cess money or the tax or levy that one can calculate and then the industry has to pay. Obviously if there is so much money that the industry needs to pay, they would rather control or minimize the water uses and then save the money because after all, it is economics that drives the operation of the industry. In fact, it makes sense, it is rather useful to minimize water use and save money, is it not?

These calculations can be done and this column is another one here, the heading here... People will need... people will pay more. Then, you see the star here and the footnote here underneath the table – the rates shall be applicable only in case of non-compliance because there could be other laws, other conditions. Suppose they are not meeting those conditions, then the charges would even go up as you can see; from one and a half paisa, this can become two and one fourth paisa – that is a lot of money actually, when we do the real calculations.

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Sl No	Name of the Industry	Category	Maximum quantity of Water
1	Ferrous Metallurgical	Integrated Iron & Steel	20 cubic meters per tonne of finished steel
2	Ferrous Metallurgical	(a) Copper Smelters (b) Zinc Smelters	100 cubic meters per tonne of copper produced. 60 cubic meters per tonne of Zinc metal produced (excluding cooling water)

There is more information as to how much is the quantity of water that could one use okay and the amount depending on the process industries – for that, you have 20 cubic meters per ton, it would be a higher number in our calculation – 100 hundred cubic meters, but that is the limit. Let us have the **further...**

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3	Chemical	(a) Caustic Soda (i) Mercury cell process (ii) Membrane cell process	5 cubic meters per tonne of caustic soda produced (excluding cooling water) 5 cubic meters per tonne of caustic soda produced (including cooling water)
4	Textile	(a) Manmade fibre (i) Nylon and polyester (ii) Viscose rayon	170 cubic meter per tonne of paper 200 cubic meter

This is again the different kind of industries. All this information is available, the laws in the published documents from the Ministry of Environment and Forests and from the Central Pollution Control Board.

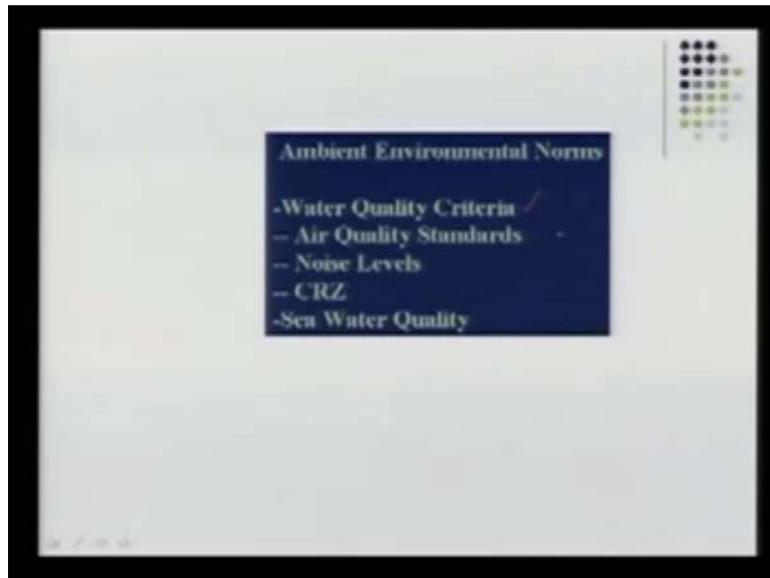
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6	Fertilizer	<p>(a) Straight nitrogenous fertilizer</p> <p>(b) Straight phosphatic fertilizer (single super phosphate and triple super phosphate) including manufacture of any acid</p> <p>(c) Complex Fertilizer</p>	<p>15 cubic meter per tonne of urea or equivalent produced</p> <p>2 cubic meter per tonne of Single Super phosphate/Triple super phosphate</p> <p>15 cubic meter per tonne in case the primary product is nitrogenous fertilizer and 2 cubic meter per tonne in case the primary product is a phosphatic fertilizer</p>
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7	Processing of animals or vegetable products, industry including processing of milk, meat, hides and skins, all agricultural products and their waste	<p>(a) Tanneries</p> <p>(b) Natural Rubber</p> <p>(c) Starch, Glucose and related products</p> <p>(d) Dairy</p> <p>(e) Jute</p> <p>(f) Sugar</p> <p>(g) Maltry</p> <p>(h) Brewery</p> <p>(i) Distillery</p>	<p>30 cubic meter per tonne of raw hide</p> <p>6 cubic meter per tonne of rubber</p> <p>10 cubic meter per tonne of maize crushed</p> <p>4 cubic meter per kilo litre of milk</p> <p>1.5 cubic meter per tonne of jute produced</p> <p>2 Cubic meter per tonne of cane crushed</p> <p>8.5 cubic meter per kilo litre of grain produced</p> <p>1 cubic meter per kilo litre of beer produced</p> <p>15 cubic meter per kilo litre of alcohol produced</p>
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We want to quickly go over this so that there is a little feel as to what kind of charges are levied depending on what industry is what industry is in operation.

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There is another thing now: staying with the environmental laws. There is another duty or another provision in the act that the government has to develop the water quality criteria that becomes for the protection on the public health, protection of the ecology; similarly, air quality standards, noise levels, CRZ is a **very...** coastal regulation zone in which the coastal waters are protected. Similarly, **what the seawater quality...** Certain norms must be specified so that people know whether these not being met with, whether people are getting the desired or required water quality, air quality, noise quality and also the regulations – that becomes very important when it comes to the development of coastal areas.

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Designated – Best – Use Classification

Class	Beneficial Uses
<i>of Rivers</i>	
A	Drinking without conv. tr. but after disinfections.
B	Bathing
C	Drinking after conv. tr. & disinfections.
D	Propagation of wild life and fisheries.
E	Irrigation, cooling and controlled waste disposal.
<i>Sea Water</i>	
SW-1	Salt pan, shell fishing and contact water sport
SW-2	Commercial fishing and recreation (non-contact)
SW-3	Industrial cooling
SW-4	Harbour
SW-5	Navigation

This slide you see is again for water uses. What the Central Pollution Control Board has done is classified the water of the rivers into five categories A, B, C, D, E. These categories refer to what are the water uses and the best water use the water available in the river can be put to. For example, if you have a very high quality of water or you wish to have high quality of water, the designated best use will be the drinking without **conventional...** 'tr.' stands for treatment, but after disinfection; the water quality is so good that we do not need to do any treatment, just do some disinfection – may be chlorination or ozonation and one can use the water; so that is category A, B, C, D and E.

What the Central Pollution Control Board has done is classified the rivers depending on the classes, depending on what kind of water quality they want. For example, we want to maintain a water quality in a certain stretch of the river or the entire stretch of the river, which is healthy for bathing. It is in our culture, it is in our ethos – the mass bathing in the river; that is religiously very important for us, so bathing quality of the river must be maintained almost in all rivers – having the water to be of the quality such that a person can go and take bath. What is that quality? These qualities are defined. That becomes the next slide.

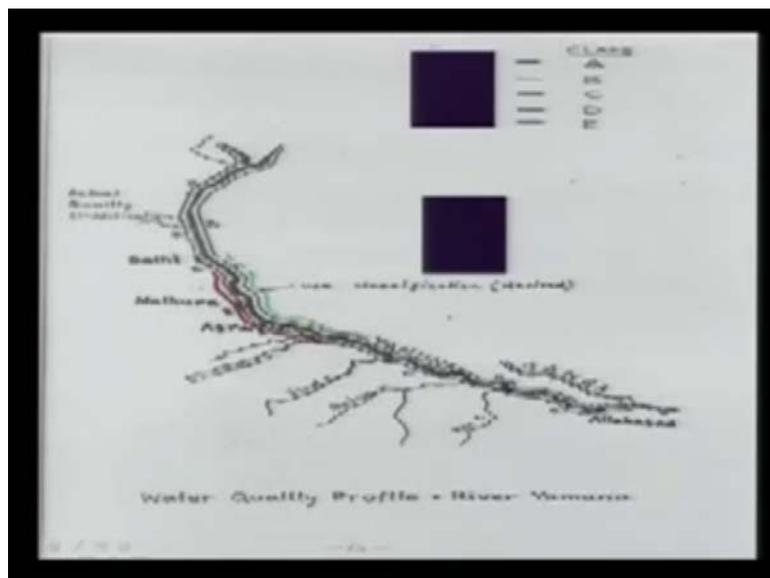
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CLASS	PARAMETER	CRITERIA
A Drinking without conv. tr. but after disinfections.	D.O. B.O.D. <sub>5</sub> Coliform MPN pH	≥ 6 mg/l ≤ 2 mg/l ≤ 10 / 100 ml 6.5 – 8.5
B Bathing	D.O. B.O.D. <sub>5</sub> Coliform MPN pH	≥ 5 mg/l ≤ 3 mg/l ≤ 500 / 100 ml 6.5 – 8.5
C Drinking after conv. tr. & disinfections.	D.O. B.O.D. <sub>5</sub> Coliform MPN pH	≥ 5 mg/l ≤ 3 mg/l ≤ 500 / 100 ml 6.5 – 8.5
D Propagation of wild life and fisheries.	D.O. B.O.D. <sub>5</sub> Coliform MPN pH	≥ 5 mg/l ≤ 3 mg/l ≤ 500 / 100 ml 6.5 – 8.5
E Irrigation, cooling and controlled waste disposal.	pH Zincum ratio Sulphur E.C. <sub>100</sub> <sup>10</sup>	6 – 8 mg/l ≤ 26 ≤ 2.0 mg/l ≤ 2280 micro mhos/cm

For example, bathing, because we will not have time to go through all the details here. D.O. stands for dissolved oxygen and it should be more than or equal to 5 five milligrams per liter. BOD, which is the indicator of organic pollution, should be less than or equal to 3 milligrams

per liter. Coliform MPN stands for most probable number and Coliform is indicating petrological pollution, so the Coliform number count should be less than 500 per hundred ml. Then, the ph: again you all will recall from your high school time that pH shows the acidity/alkalinity of the water in a broad sense; essentially, it shows the hydrogen ion concentration – that you will recall; I am sure you will recall that the pH is log of H ion concentration, log is to the base 10 and H plus is the concentration of the H ions when expressed in moles per liter. Similarly, the water quality requirement will not be so stringent if the purpose of the river or the purpose of the water is for irrigation, cooling and controlled waste disposal. However, I again say environmental laws are not fixed entities – they keep on changing and so we should always keep ourselves updated with environmental laws. In fact, these laws are also being revised and being changed.

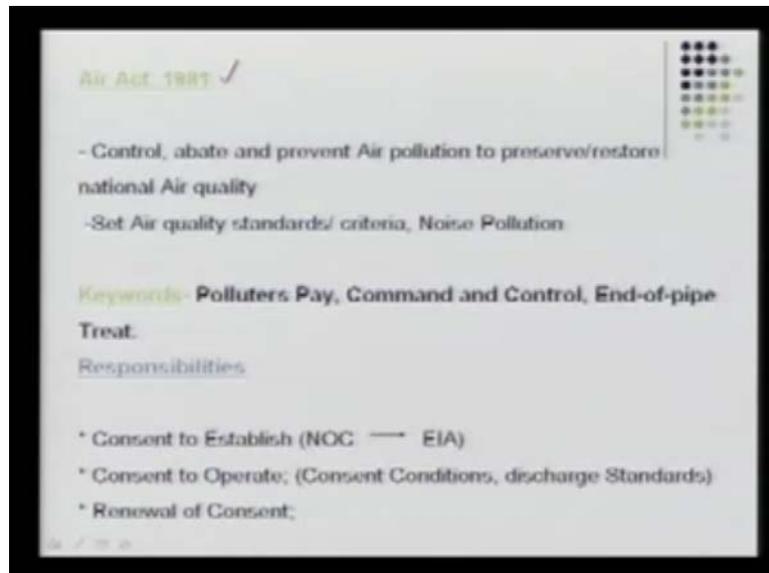
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How is pollution control being planned or is planned? For example, this is some river that is flowing here. In fact, this is river Yamuna here. Here, the quality of the water is E, actual and the desired is C, so that way we can very quickly understand where and how the problem exists, because this is what is the desired. Use classified or you can see the desire and here is the.... The red line what you see is the E category as we defined last time – it is actual, for example. This is a little old slide and we do not know what the actual situation is right now, but this is from the water quality profile of the river Yamuna. You can see very quickly these maps and we can find out what are the actual levels and what are the desired levels and the

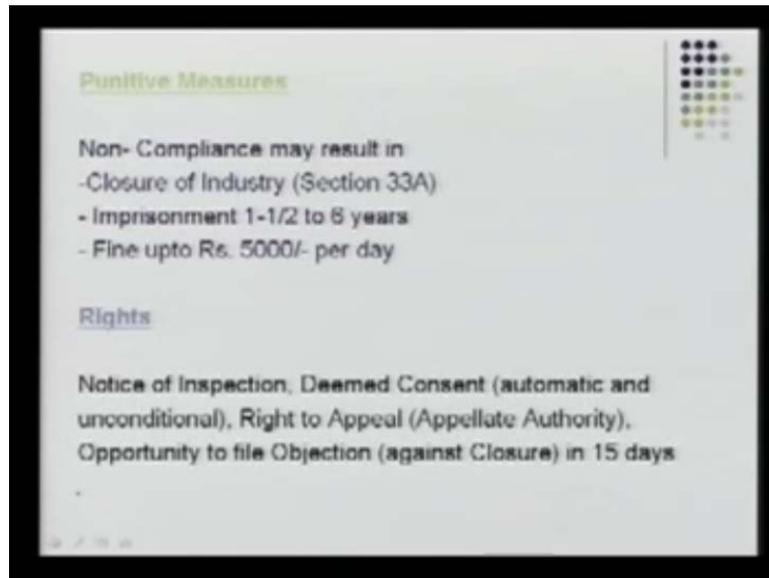
difference or the gap between the actual level and the desired level is indicative of what we need to do and what we need to improve.

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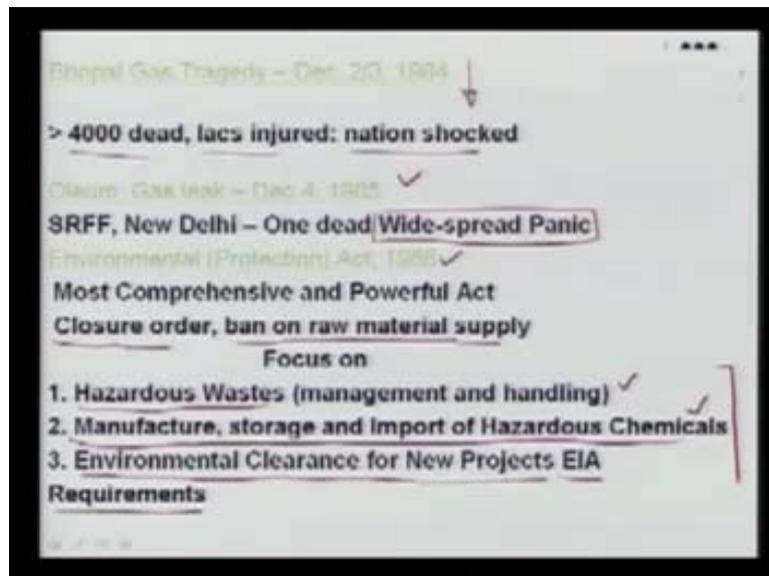
Environmental laws do not end there. The Air Act came in 1981 for the control of air pollution. Again, it was very similar to the Water Act but the water in fact is replaced by air. Again, needed to control, abate and prevent air pollution to preserve and restore the national air quality, set air quality standards and criteria and the noise pollution control or noise pollution is part of the Air Act – that came through an amendment. Again, Polluters Pay principle, command and control, end-of-pipe treatment – that is being talked about in the Air Act. Responsibilities: very similar to the Water Act. Consent to establish, consent to operate and the renewal of the consent – very similar kind of concept here when it comes to air pollution.

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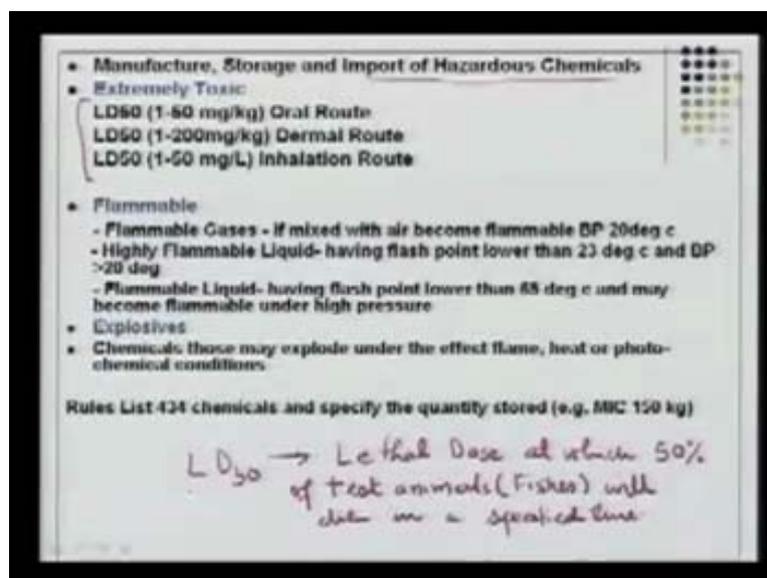
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In spite of having these laws, a very tragic event happened in India. It was on the night of 2<sup>nd</sup> December, in the morning of 3<sup>rd</sup> December in Bhopal that the Bhopal gas tragedy took place. It caused a very serious problem and almost the entire country was shocked with such an industrial accident. In fact, more than 400 people were dead, thousands were injured and the country was shocked. Then, it was realized that we have the Water Act, the Air Act and yet, something of this size and dimension can happen. Then, one more accident that was reported

was on December 4, 1985 – it happened in New Delhi. There was a widespread panic that was sure and this resulted in the need to change the laws. The laws keep on changing depending on the need and the situation or the demand from people for a cleaner environment. The most comprehensive and powerful act came in 1986. In this law, the implementing authorities had the powers for closure order, ban on the raw material supply and the focus slightly shifted from just water and air to hazardous waste, because hazardous waste can cause serious problem within a short time; management and handling: it became focused on manufacture, storage and import of hazardous chemicals because some of the chemicals could be so hazardous that if they come into the environment, they can certainly cause serious problem and even death – death of not one but several people, so the focus became this one. Another important thing that came out of this Environmental Protection Act is the environmental clearance procedures for the new projects and that is called the EIA requirements. Briefly, we will discuss some of these rules or the new legal provisions that came out of the Environmental Protection Act. Let us see some of them.

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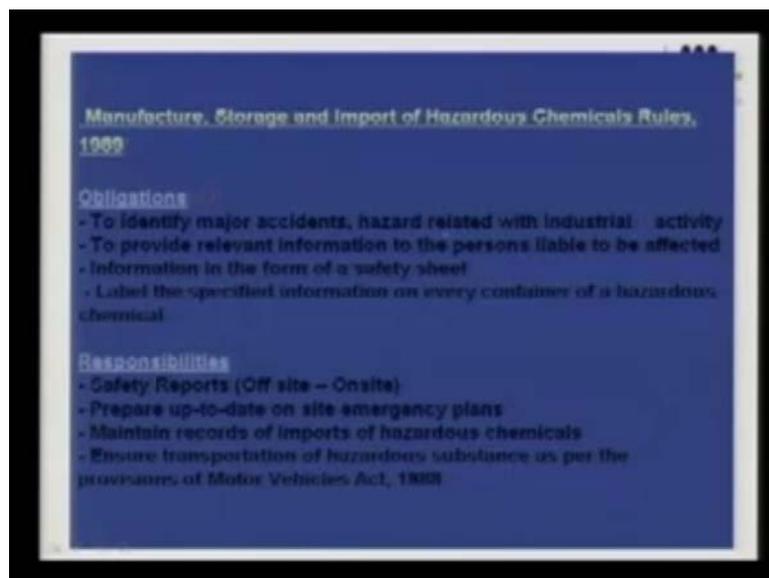


One of the important legislations that is a kind of an offshoot of the Environmental Protection Act is the Manufacture, Storage and Import of Hazardous Chemicals. The act also defines what are the extremely toxic chemicals, what are the highly toxic chemicals and they are decided on the basis of certain parameters called LD50. What is LD50? It stands for the lethal dose at which (a little dose of the chemical at which) 50 percent of test animals (they are mostly fishes – there are certain kind of fishes that can be used for this kind of test) will die,

so that decides the... well, we should not only say die... in a specified time – so that decides how toxic and how difficult from the environmental point of view the chemical is.

We can quickly see this again. In fact, depending on the... it is not only just the toxicity, it could be flammability of the chemical that is very because that could be important, there are certain explosive chemicals that come under the ambit of this act and in fact the documents concerning this law, this rule... the rules lists 434 chemicals and specify the quantity that can be stored. This is one of the examples that is there. If you do not store much and you have to store it with the proper precautions, proper care, then you can store, but again you cannot store more than a specified quantity so that even if suppose by chance there is some accident, the dimension of the problem will not be so severe and it will be manageable, one can tackle it with efforts and with the facilities available well within the plant.

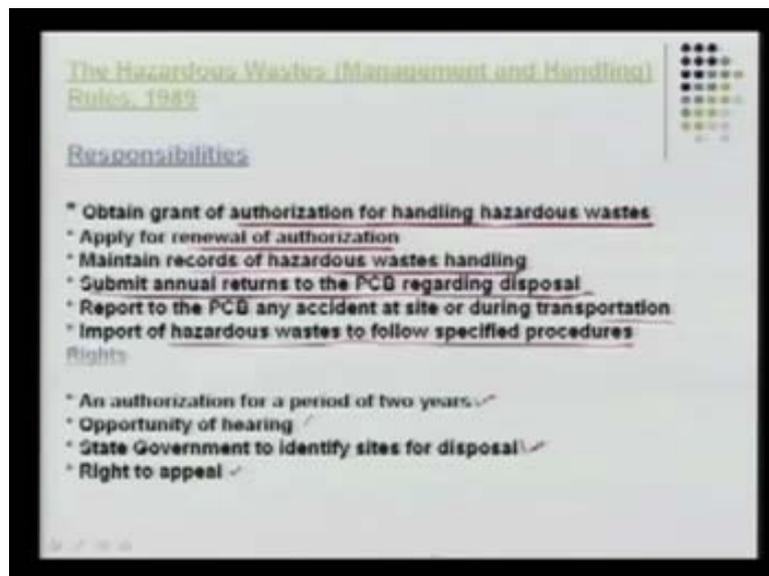
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Still staying with the chemical rules, what are the obligations? What the industry needs to do is to identify the major accidents – what could happen – and hazards related to the industrial activity, to provide relevant information to the persons liable to be affected – suppose there is a large industry near some colony or where people are living, it is obligatory for the industry to specify and say that they are operating such and such a process they are using such and such chemicals that are toxic and can cause problems and safety sheets need to be maintained and the specified information should be labeled on every container of hazardous chemicals so that we know exactly what is stored in case of accidents or in case of a situation that is

untoward or some difficult situation – we know what kind of chemical is stored and what needs to be done quickly to minimize its impact. Responsibilities for the industry: safety reports they have to maintain both off-site and on-site, prepare up-to-date on-site emergency plans in case things go wrong, maintain records of imports of hazardous chemicals and ensure transportation of hazardous substances as per the provisions of the Motor Vehicles Act of 1988 – there are ways in which hazardous chemicals can be transported and they must be followed properly.

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Similarly, there are rules for waste management, hazardous wastes. Earlier, what we were talking about was hazardous chemicals but here, what we are talking about is hazardous waste. Obtain the authorization for handling the hazardous wastes from the authorities, apply for renewal of the authorization if the authorization expires, maintain records of hazardous waste handling and the amount that is generated, submit annual returns the way you file your income tax return and if you are operating an industry, you better file the return on the amount of the hazardous waste that is generated and all of the information that is required, report to Pollution Control Board any accident at the site or during transportation – that is very important, follow specific procedures for the import of hazardous waste – that needs to be followed, you just cannot import hazardous wastes that is for reprocessing from another country – that also has certain procedures that need to be followed.

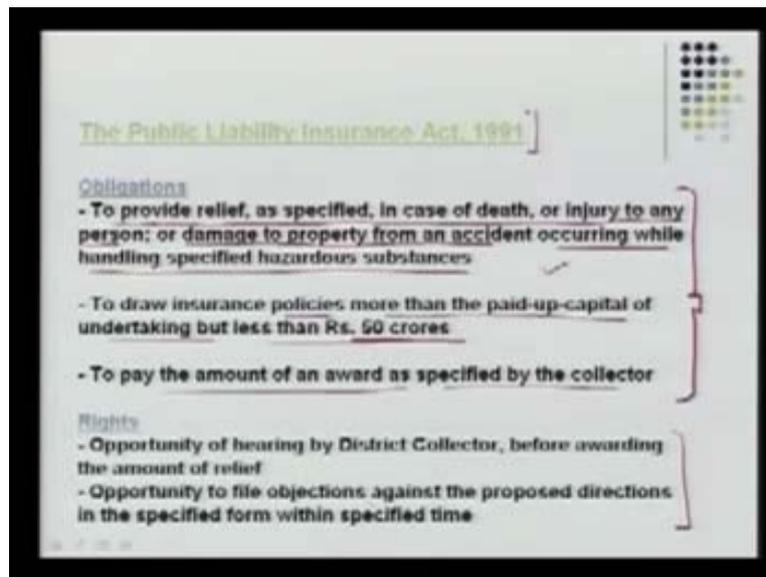
What are the rights for the industry? An authorization for a period of two years is generally given but this is not always guaranteed, opportunity for hearing, the state government to identify the sites for the disposal of hazardous waste because hazardous waste needs to be disposed of properly and of course as per the other laws, the right to appeal to the authorities.

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Waste Category	Type of Waste	Regulatory Quantities
Category 1	Cyanide Waste	1 kg/yr
Category 2	Metal finishing	10 kg/yr
Category 3	Waste containing water soluble Heavy metals	10 kg/yr
Category ...		
Category 17	Off specification and discarded product	No limit
Category 18	Discarded containers, liners of hazardous and toxic waste	No limit

Waste categories have been defined: category one, two to eighteen have been defined and what it really means is category one is the category in which cyanide waste is there, category two – metal finishing, waste containing water-soluble heavy metals, so you can see that depending on the category, there are certain amount of regulatory quantities that one can handle, produce and dispose of; again, that is driven and decided by the law; the laws have become very stringent now with time and constantly changing – I say it again and again because no law is fixed.

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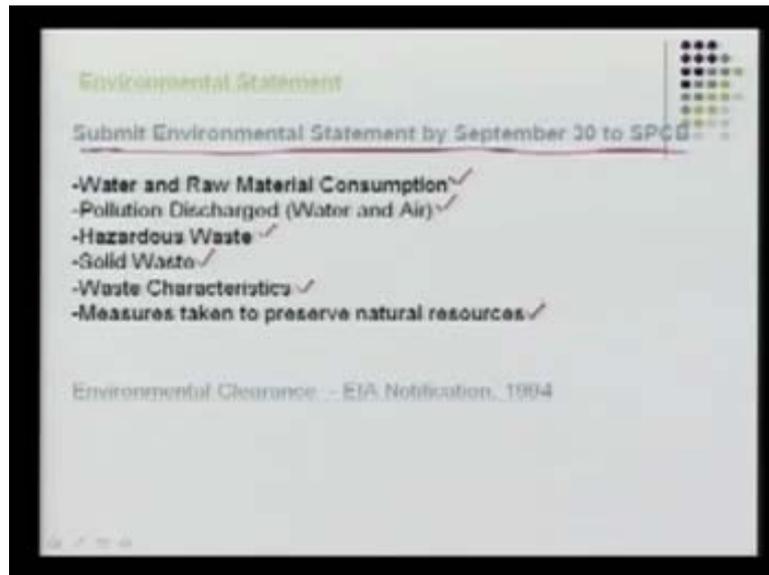


There is another law that the industry needs to follow: the Public Liability Insurance Act that came in 1991. Its purpose is that every industry needs to buy an insurance. It is something similar to driving a car and you need to buy an insurance because you can injure, you can meet with an accident and you need to pay someone you injure; because of you, somebody got injured, then you need to pay them, the insurance company can pay, so you have to buy an insurance. The idea was to provide relief, as specified, in case of death or injury to any person or damage to property from an accident occurring while handling a specified hazardous substances so that there is some form of money available. Of course, one should take every effort that no accident occurs but in case there is, there should be a proper mechanism to quickly provide a relief to the people – that is the mechanism here. Then, to draw the insurance policies by the industry more than the paid-up capital of undertaking but less than Rs. 50 crore. Let us read it again: to draw insurance policies that could be more than paid-up capital of undertaking but should be equal to the paid-up capital but it should be less than Rs. 50 crore, so you buy the insurance and obviously to pay the amount of an award as specified by the district magistrate and the collector in case it is an accident, in case somebody suffered because of the accident that took place in the industry.

Obviously, the idea here is that money is available in case of emergency but as we are driving the car, we become very careful because we know that if we make an accident, we will cause more problems in terms of the insurance – it will go up, so you better be careful and not cause an accident. Similarly, the industry also is under pressure in a way to perform better so that

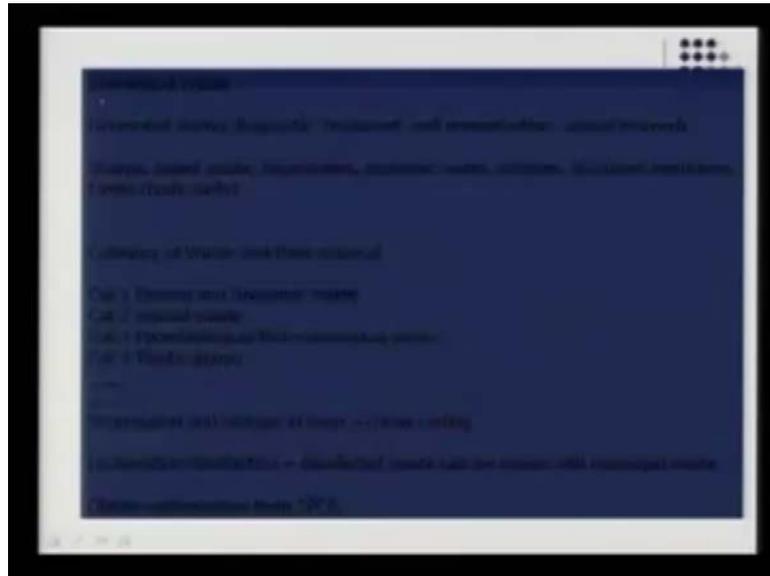
their insurance policies or insurance installments do not go up. Very important act and very useful act. There are certain rights – the opportunity of hearing by the district collector before awarding the amount on relief to the people who suffered because of the accident, opportunities to file objections against the proposed directions in the specified form within a specified time, so the industry also can make an appeal and look for the redressal.

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There is also a requirement that every industry must submit an environmental statement by September 30 to the State Pollution Control Board. What does it need to specify? The water and raw material consumption quantities, the pollution discharges in terms of water and air, hazardous waste information, solid waste, waste characteristics, and measures taken to preserve natural resources. Another important legislation that has **come into...** and that is again an offshoot of the Environmental Protection Act of 1986 is biomedical waste.

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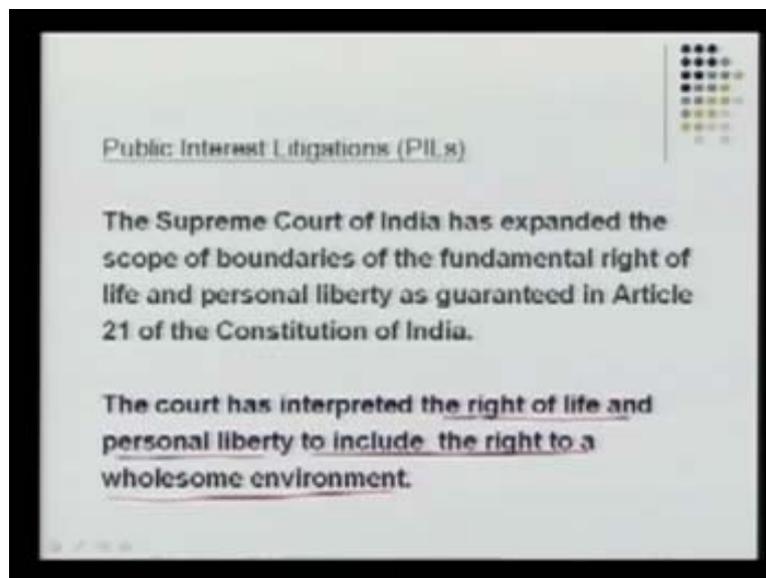
What one would realize in the hospitals whether it is human hospital or veterinary hospitals, they generate a lot of waste and that needs to be disposed. This waste can be very harmful because it could be infectious waste and that can cause serious problem. For that again, there are certain laws. The waste can be generated during the diagnosis, during the treatment, during immunization and during animal research – that waste needs to be disposed of. There could be waste coming from the hospitals/the shops, the doctors or surgeons use tools for surgery, it could be soiled waste that could be either disposable, there could be anatomic waste, there could be some cultures, discarded medicines/some expired medicines – that needs to be discarded, there could be some body parts that need to be discarded – all that becomes biomedical waste.

There have to be laws and rules to handle biomedical waste. For the purpose of implementation, biomedical waste also has been categorized into certain categories and some of the categories are specified as you see on your screen: human and anatomic waste is one category, animal waste is the second kind of category, microbiological or biotechnological waste is another category, waste that is sharp like knives and tools the surgeons use – at some point, those need to be disposed of. The most important thing is that you do not want to mix these waste; mix – no; if you do not mix, then you segregate it – that is what the law says: segregate; in order to not have any confusion, segregate in bags that are of different colors so that one would know where this waste is coming from. The other issue with biomedical waste is suppose there are some infectious waste and if you mix that waste with other waste, all of

the waste would become infectious and people who are handling the waste or the people being disposed of on the landfill site or the ragpickers can pick up certain things and they can get the disease because of the biomedical waste that is spreading out. So there is a need for proper collection, proper treatment and then the proper disposal.

What are the ways and means to handle biomedical waste? There is incineration – certain amount of the waste can be burnt simply, there are certain wastes that could be disinfected, then the disinfected waste can be mixed with the municipal waste and then there is no fear of getting infection from the biomedical waste. Then again, all the hospitals, large hospitals must obtain an authorization from the State Pollution Control Board and they must follow the rules and regulation specified for biomedical waste – this has become very important. Almost all the hospitals in the country are now following the biomedical waste rules and it is important for our public health, for the people at large that no infectious waste comes out from the hospitals and does not cause any other serious problem for the people who are handling the waste or the people at large.

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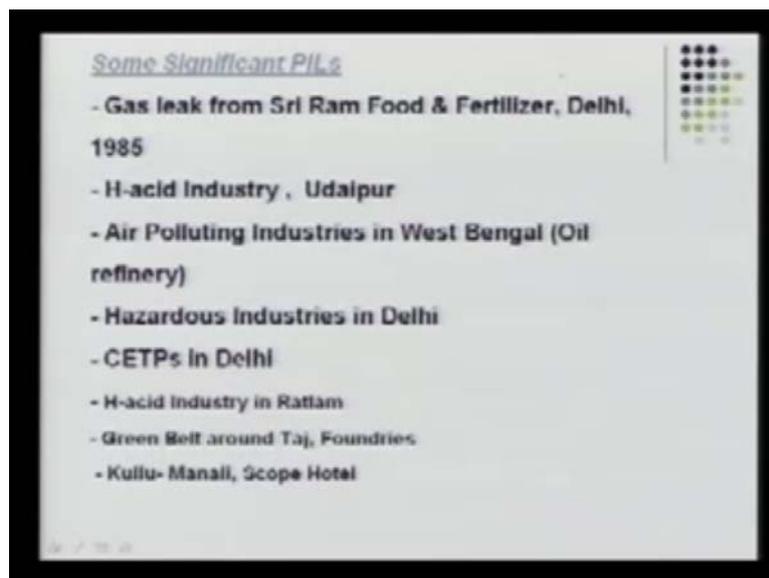


Another very powerful means for pollution control in the country is called public interest litigation. I am sure you all hear this in the newspaper – the actions being taken by the courts and what **it says...** In fact, the Supreme Court of India has expanded the scope of the boundaries of the fundamental right of life and personal liberty as guaranteed in article 21 of the Constitution of India. The guarantee the constitution gives to us for personal liberty and

right to our life is simply not just live – **you need...** the right to life with a proper environment and clean environment. So in some sense if this fundamental right is infringed, then there has to be some action mechanism that is put into place and that comes through public interest litigation.

The court has interpreted the right of life and personal liberty to include the right to a wholesome environment or clean and proper environment. Suppose the environment is not clean, it means in a way the court can interpret this as infringement of the fundamental right to live and personal liberty, which is a very strong and powerful interpretation our courts have given. That in fact has kind of stimulated the general people at large – many public interest litigations have been filed and it has resulted in a clean environment, many cleaner processes.

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In fact, we have some of the examples as you can see here. Some of the important PILs are the gas leak from Shriram Food and Fertilizers in Delhi in 1985 – that became a subject of PIL, H-acid industry in Udaipur, air-polluting industries in West Bengal including some of the oil refineries, hazardous industries in Delhi became a PIL because people thought the hazardous industry could be harmful and it could be dangerous, common effluent treatment plants in Delhi, H-acid industry in Ratlam, many PILs are filed in Agra to protect the Taj and many other examples you see here that have resulted in very quick decisions and people have

become ah very active and participating in the PILs and that could lead to a very healthy and very good environment.