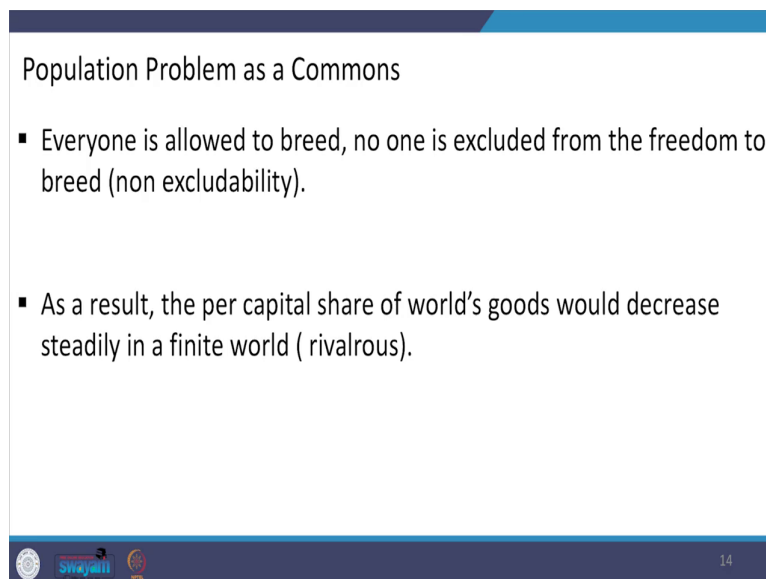


**Introduction to Environmental Economics**  
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**Lecture – 07**  
**Commons and Collective Action Problem: Seminal Theories-III**

Hello everyone. Let us continue our discussion in the topic population problem as a metaphor that is introduced by Hardin. And, in this lecture, we will be discussing the tragedy of freedom in commons. And, especially the author Professor Hardin, he has taken into account two context; one is the tragedy in the commons in form of population growth and the second one is the tragedy in the commons in form of pollution itself.

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Population Problem as a Commons

- Everyone is allowed to breed, no one is excluded from the freedom to breed (non excludability).
- As a result, the per capital share of world's goods would decrease steadily in a finite world ( rivalrous).

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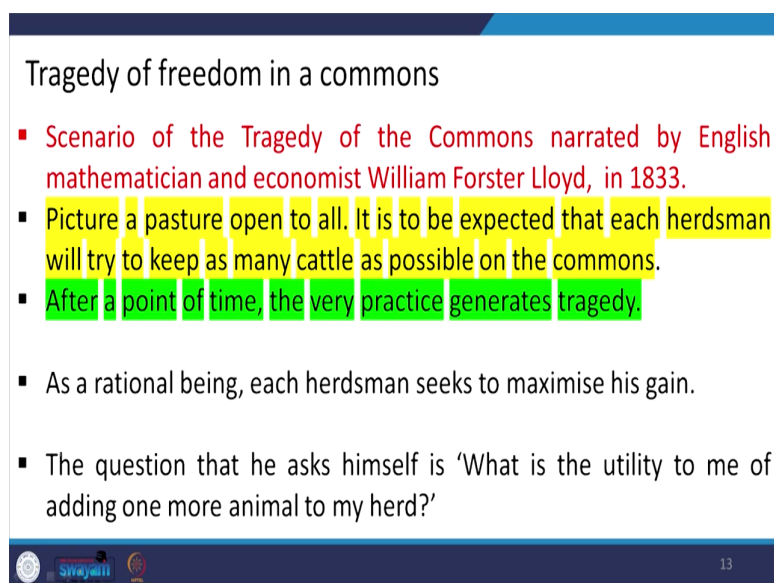
So, that is why a Hardin describe this population problem as a commons itself, why again? Again we need to analyze the characteristics of the commons. So, from the very first lecture we

came to know that, this commons satisfied two attributes or characteristics; the first one is it is non-excludable and the second one is; however, it is rival. So, if everyone in this context of over population or population explosion, everyone is allowed to breed; that means, you can breed or he can breed or she can breed so; that means, it is leading to non-excludability, no one is excluded from the freedom to breed.

And, the second one is that as a result of this the per capita availability of world's goods, it will be decreasing in a finite world; that means, the share is actually rivalry, if you are consuming; obviously, the second person in a row cannot consume. So, it is highly a rivalrous. And, if you are producing one child and he is getting the benefits from this world, in terms of enjoying some goods and services.

Then; obviously, the second person who wants to breed bring a child into the world, the same amount benefits we cannot actually enjoy, that is what it is said that. This kind of scenario that is population problem is also satisfying the second characteristics of the commons that is the rivalrous characteristics. So, because of these true attributes, we can say that the population problem can be treated as a common.

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Tragedy of freedom in a commons

- Scenario of the Tragedy of the Commons narrated by English mathematician and economist William Forster Lloyd, in 1833.
- Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons.
- After a point of time, the very practice generates tragedy.
- As a rational being, each herdsman seeks to maximise his gain.
- The question that he asks himself is 'What is the utility to me of adding one more animal to my herd?'

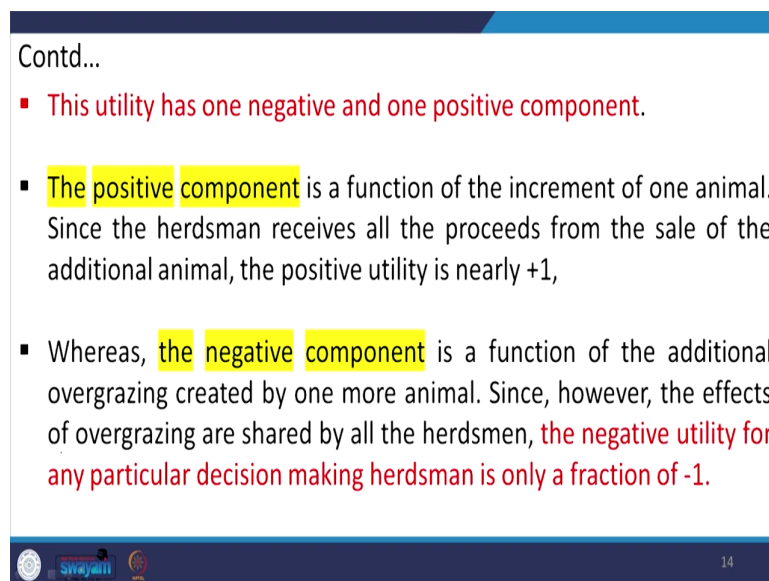
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Then, what is the tragedy? Tragedy of the freedom in a commons so, in the in his subtitle he discuss about, the scenario of the tragedy of the commons. And, he had taken the narrations by the English mathematician and economist William Forster Lloyd, which he talked about which you which he actually Picturized in 1833.

So, what is the picture about, what is this imagination about this a commons? So, this is about the picture of a pasture, which is open to all, open to all the herdsman. And, it is to be expected that each of the herdsman, they will be trying to keep as many as many cattle, as possible on the commons, because it is free and it is accessible to all. But; however, if every herdsman they are practicing the same practice, they are doing the same practice by adding one more, one more animal to their herd. And, it is and then everyone is accessing this pasture, then what is happening or what will happen in this if this practice is continued?

So, after a point of time the very practice generates the tragedy. What is the tragedy in destruction, degradation of that particular pasture? However, if you are saying, if you are thinking about the choice about the human being or here it is the case of herdsman, then any rational being or any rational herdsman. What they will be doing? They will be trying to maximize their gain, what is their gain? That means how to utilize or how to increase the utility by adding one more herd and sending their herd to the pasture itself.

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- This utility has one negative and one positive component.
- The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1,
- Whereas, the negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsman, the negative utility for any particular decision making herdsman is only a fraction of -1.

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So, now the question he ask himself. What is the utility to me of adding one more animal to my herd? This is what every rational herdsman, they will be asking them self. So, what will be the answer or what is the logical answer they will be thinking about? Out of this utility, if you see this then it has two aspects; one is the negative aspects and the second one is positive aspects out of this decision, that let us add one more, let us add one more to my herd.

So, in the if you see the positive components, then you will be finding that, when the herdsman, he will be trying to add one more, animal into the herd into his herd then; obviously, what about the gains, he will be getting out of selling these herd, selling a particular animal that animal only. Then, he is the only one; he can get all the benefits out of it he can sell the animal. And, he can whatever the benefit or whatever the cost he will be doing, then he can actually get it.

So, that is why the sale of the additional animal, if you see he will be getting fully and the positive utility if you say, it is almost nearly plus 1, it is positive so, it is nearly 1. But, if you take into account the negative components of this decision. What is the decision that is adding one more into the herd? So, the here what is the negative aspect here, that the quality of this pasture or the quality of the quality and quantity of the grass, in the pastured itself, it will degrade.

So, as a result if the particular herdsman will be suffering, that he will be thinking that my animals or my herds they are getting less, quantity of quantity and quality of the grass in the pasture. So; obviously, the same feeling or the same will be also felt by the other herdsman. So, if this is the cost to the first herdsman, this is also the cost of cost to the second and third and n<sup>th</sup> herdsman.

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Evaluation of Benefits and Costs

- In this situation, now the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd., And another; and another..... This goes on.
- But this is the conclusion reached by each and every rational herdsman sharing a commons. And **this is the tragedy.**

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So, as a result the negative utility for a particular decision making herdsman is only a fraction of one only, it is not nearly 1, it is just a fraction of minus 1. So, in this context, if our assumption is that, the human beings are rational or here in this case we are saying that only herdsman's are rational then; obviously, they want to try they will be trying to maximize their utility out of it. So, how to say that how their maximizing their utility by evaluating the benefit and cost out of this actions?

So, in this situation the herdsman they will be concluding that, the only sensible course for him to pursue is to add another animal to his herd, and another, and another, and this will be going on. So, what is the conclusion is reached by this scenario that, William Lloyd has actually talked about that every rational herdsman will be when they will be sharing a commons; it will be leading to a tragedy.

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What is tragedy here?

- Each herdsman is locked into a system that compels him/her to increase his herd without limit- in a world that is limited.
- Ruin is the destination towards which all herdsmen rush, each pursuing his own best interest in a society that believes in the freedom of the commons.
- In this process, Freedom in a commons brings ruin to all.

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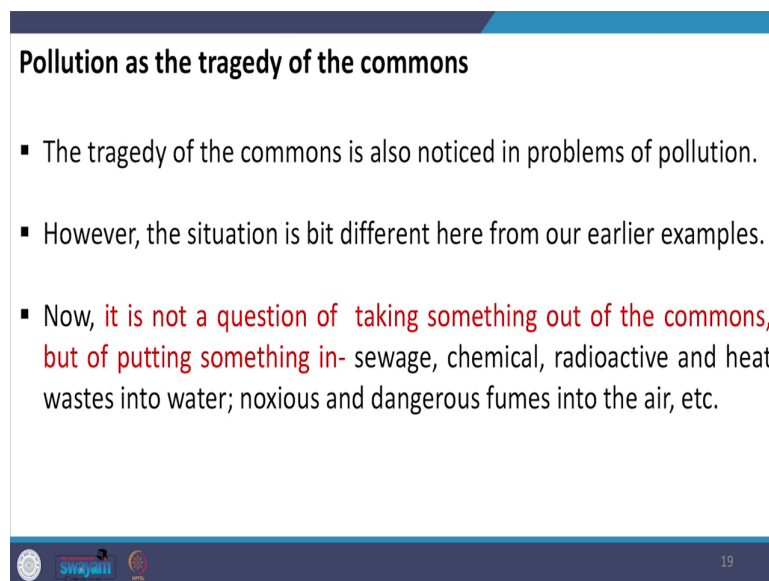
Then, what exactly the tragedies here? So, here the situation is that each of the herdsman they are locked into a system that compels them to increase the herd without any limit, but remember that this world is limited; that means, the pasture is limited, but they are thinking to add unlimited amount of unlimited number of animal to their herd.

So, as a result what is what will be the final situations? So, it will be a ruin. Ruin is the destination towards which all herdsman rush this is what this is a kind of (Refer Time: 08:21) per possessing more animals, then extracting more pasture extracting more grass from the pasture itself. And, he is pursuing his own best interest in a society that believes in the freedom of the commons itself, because everyone is having this freedom to access the commons and as a result it is ended in the ruin.

So, in this process we can say, Hardin remarked that freedom in a commons brings ruin to all, if your decision to access the pasture is that you can access more you can access more, you do have this freedom, no one can actually change your decisions to access the pasture then obvious still be going to ruin. Some more examples in practical life that we are also following we are also feeling the same situations.

So, the examples can be the fisher in the oceans or the national parks all over the world which is open to everybody. So, these are the situations also in where we are finding the similar kind of actions or decisions by others, which are leading to degradations of fisher in the oceans or the biodiversity in the national park itself.

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**Pollution as the tragedy of the commons**

- The tragedy of the commons is also noticed in problems of pollution.
- However, the situation is bit different here from our earlier examples.
- Now, it is not a question of taking something out of the commons, but of putting something in- sewage, chemical, radioactive and heat wastes into water; noxious and dangerous fumes into the air, etc.

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The second aspect he talked about apart from this pollution as an example of commons and how it is being dealt the second example, he talked about is pollution. And, there he argued



that pollution is also said to be the commons and which satisfies this characteristics, but here the situation is something different.

So, what is the situation different or how the situation is different from our earlier example? So, in this case in the earlier case, when each of the herdsman they are trying to extract something out of the common, but here when you are discussing the pollution as a as a as an example of the tragedy of the commons, here we are thinking about something to put in where; obviously, in the commons itself.

Let us take the case of example of your water. So, water is a commons, because no one can forbid to exclude you from using this in any manner, but; however, it is rival, because, the quality of the water and the quantity of the water will be changed, when one more one more individual will be added to do the same visions.


So, in this case when you are talking about this sewage problem, chemical problems, when you are dumping into the or running your sewage to the common water, or the chemicals you are you are doing. Or radioactive or heat waste into water noxious and dangerous fumes into the air itself, then these are the cases which you are saying the tragedy of the commons, in terms of pollution either in air pollution or water pollutions.

And, if you just like you the earlier example, if you want to see that what is the utilities out of it? That means, when you are polluting, when you are actually letting your sewage go to this common river or water. And, your neighbour is also doing the same activity and his neighbour is also doing the same activity and then this process goes on, then we are just trying to find out or we are just trying to evaluate.

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- What is the share of benefits and costs?
- The rational man finds that his share of the wastes he discharges into the commons is less than the cost of purifying his wastes before releasing them.
- Since this is true for everyone, we are locked into a system of 'fouling our own nest', so long as we behave only as independent, rational, free-enterprisers.



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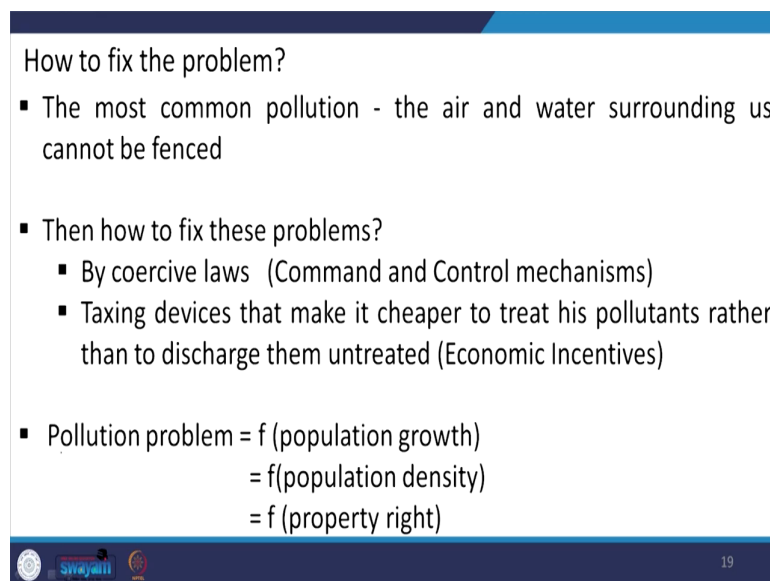
The share of benefits and costs in this decision, that let us put our own garbage in the open commons maybe in the water or in the air. So, here again we are assuming that we are the all of us are rational animal, that is why what will be finding that our share of waste we are discharging into the water or air which less than the cost of purifying them. So, what is that?

So, if you are not dumping your wastes either in water or air then; obviously, you do have to purify them, but here the rational (Refer Time: 12:47) things, that my share of waste, that I am discharging into the commons, it is less than the cost of purifying the same. Before releasing it, then this is how I will be continuing the same decisions then let us let us dump all my waste to this commons. And, this is this logic is applicable for everyone, that is why we can say that we are locked into a system of 'fouling our own nest' so, long as we behave only as independent, rational and free enterprisers.

So, what is the assumption we are saying? About us about the human beings that we are independent, that is why we get independent decisions, that let us put my garbage my waste into the this commons, rational; why rational? Because, if otherwise I have to purify my waste then; obviously, it is not it will not be cost effective, if I am going to leave it open without treatment into the commons then it is cost effective to me.

So, that is why this is how I am trying to maximize my utility or I am behaving as if I am rational and the third one is free enterprisers. So, no one is no one is bothering about it everyone is free to take it is own decision regarding anything. So, if these are the conditions and the context then how to fix this problem?

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How to fix the problem?

- The most common pollution - the air and water surrounding us cannot be fenced
- Then how to fix these problems?
  - By coercive laws (Command and Control mechanisms)
  - Taxing devices that make it cheaper to treat his pollutants rather than to discharge them untreated (Economic Incentives)
- Pollution problem =  $f(\text{population growth})$   
=  $f(\text{population density})$   
=  $f(\text{property right})$

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Because, in this examples of air pollution and water pollution pollutions. We cannot actually Fence them, we cannot actually put a Fence around the water or around the air to prevent this

pollution problem. So, if it is not possible by this manner, then how to actually fix this problem of air pollution and water pollution, he talked about and then he talked about that this is a problem of commons itself.

So, again he narrated about two mechanisms to fix these problems, from the practical real world situation itself. The first one that we are also finding in economic literature in environmental policy, that is the coercive loss. What is coercive loss? So, in again pollution and environmental policy literature we are finding these are the case of command and control mechanisms; that means, it is here the authority fixes or commands that these are the things you need to do..

And, what are the controlling mechanisms? If these are the targets, then how to actually achieve these targets, by putting certain command and control mechanisms, by the government or by the regulatory authority itself. And, to some extent this problem has been tried to be fixed. And, the second mechanism could be taxing, that if you are doing any violations or if you are actually letting your waste go and merge into the commons then; obviously, you need to pay for it.

So, in the economic literature we are also finding this theory, which is called as polluters pay. If, you are polluting then; obviously, you have to pay for it. And, sometimes we are also in this literature we are finding the cases of economic incentives. So, what are the economic incentives? That you need to see that, if you have to find how to purify your waste?

Then, if there are any technical mechanisms or technologies available to purify them. The price of this purifier can be lessened by the government itself by giving some subsidies, that is why you as a polluter will be thinking twice, then let us take these advantages of the subsidy. And, get this get my wastage purified before letting it go to the commons itself by.

So, this is how we can say he also talked about these mechanisms, that how to fix the problem of pollution itself. And, in this context of the population problem, he then he can set it to narrate, that which problems or which are the issues or the factors, that are leading to these

pollution problem. First of all he talked about pollution problem, then he talked about this population problem. He try to link it link both of these both the terms.

So, here he talked about this pollution problem is a function of; obviously, the population growth. And, it is not only the population growth as a factor, but it also depends on the population density as well, that is what Malthus talked about the explosion geometric increase in the population.

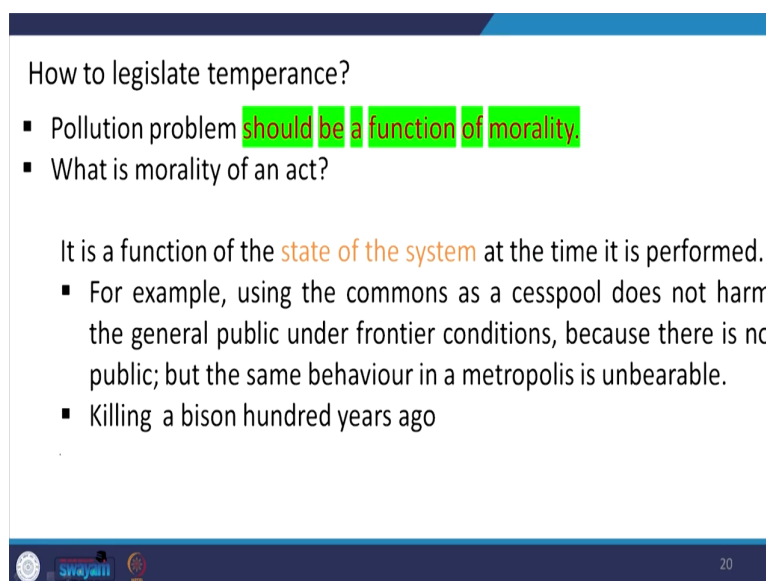
And, the third one is this pollution problem is also a function of the property rights. Why it is the case of property rights? Because if you do have the property right on a piece of property then obviously, you want to see that the second person should not be suffering. And, if the second person is suffering he can claim that, the first person is doing this problem, because he is having this property right.

And, out of his activity in that particular piece of land the externality or negative activities coming out from it, because there is no well-defined property right, it is also leading to the pollution problems. Again, the popular the popular examples that we are also finding in economic literature is the upstream river and downstream river.

Suppose, in upstream river there is a factory and in the downstream river, there is a fishery. So, what is happening? In the upstream river, the factories there and the factory owner he is he is dumping all his garbage and all these, all these poisonous water into this river water. Then; obviously, the population of the fishery in the downstream it will be affected.

But, this the owner of this fishery, he cannot actually claim anything from the factory owner, why because there is no well-defined property right of river in that locality. So, that is why this pollution problem can also be a function of the property right as well. And, another thing he talked about is how to legislate temperance?

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How to legislate temperance?

- Pollution problem should be a function of morality.
- What is morality of an act?

It is a function of the state of the system at the time it is performed.

- For example, using the commons as a cesspool does not harm the general public under frontier conditions, because there is no public; but the same behaviour in a metropolis is unbearable.
- Killing a bison hundred years ago

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So; that means, here he talked about that it is the morality which can actually govern about solving this problem, that pollution problem should be a function of morality. So, what is the morality of an act? So, it is a function of state of the system at the point of time when it is performed. So, it is actually talked about the state of the system. So, what is the situations that was existing at that point of time and depending on that, you will be saying that whether it is a moral act or it is not an not a case of moral act.

So, philosophically we can say, using this commons as a cesspool does not have the general public under the frontier conditions, because there is no public. But; however, if you are doing the same thing in a metropolitan city then; obviously, this problem is not variable. Again why because, it is the state of the system? In the first case that it is a frontier; that means, no one is going to be affected if you are dumping anything underground. But in the second case it is the

case of metropolis and where whatever your action is there, if it is any negative, then it will be borne by the others.

So, that is what you are saying the state of the system is important, in defining any activity moral or not moral. So, another example we talked about is the killing of a bison 100 years ago. So, 100 years ago killing an animal there is no problem at all, but right now the situation in the system has been changed. Let us talk about the number of bison's. So, they are nearly endangered. So, in this context can you say that if you are actually hunting a bison so, is it moral? Can you say it is a moral activity?

So, that is what it depends upon the state of the system itself. So, he (Refer Time: 22:11) that, the morality is system sensitive escaped the attention of most codifiers of ethics in the past. We need to talk about ethics and morality in the philosophical literature as well.

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- The laws of our society follow the pattern of ancient ethics, and therefore are poorly suited to governing a complex, crowded and changeable world.
- Prohibition is easy to legislate though not necessarily to enforce.
- Sometimes we face such situations that lead us to think- who will guard the guards themselves?
- Thus, the challenge is to invent the corrective feedbacks that are needed to keep custodians honest.

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So, in (Refer Time: 22:24) you can say, if you have to legislate it, this kind of actions that what to do or what not to do; in different specific context or situations, then you will be finding that, this prohibition is easy to legislate. If, you have to prohibit no hunting, it is perhaps easy easier task, than to enforce. Who is going to enforce it? Obviously, it is the it is the ah it is the administrators.

So, that is why you can say that sometimes we face such situations, then let us to think who will guard the guards them self right. So; that means, if the administrator or the or the fellow persons in the hierarchy, who are suppose to implement in the ground reality. If, they are not actually listening to or they are not actually obeying to this legislation, then what will be happening, who will be guarding the guards themselves?

So, thus we can say that from this tragedy of the commons, he talked about that challenges to invent the corrective feedbacks, that are needed to keep custodian honest. So, this is a very difficult task in that. And, another thing he talked about that freedom is actually very intolerable, because he simultaneously talked about this population explosion and also the pollution case.



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Freedom to breed is intolerable

- If over-breeding brings its own punishment like starvation or death, then there would be no public interest in controlling the breeding of families.
- But in a welfare state, it does not happen and the tragedy of the commons happens.
- The concept of freedom to breed with the belief that everyone born has an equal right to the commons is to lock the world into a tragic course of action. Eg.  
The Universal Declaration of Human Rights describes the family as the natural and fundamental unit of society. It follows that any choice and decision with regard to the size of the family must irrevocably rest with the family itself, and cannot be made by anyone else.

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And, in the population explosion case he talked about, if you everyone is free to breed. And, in case of pollution also everyone is actually free to dump their garbage in the commons. So, if over breeding brings it is own punishment in this case of population explosion, then perhaps the problem of population explosion could have been addressed. That means, population explosion is there, if you are over breeding then; obviously, if you are suffering from starvation or disease, then there will be no public interest in controlling the same kind of breeding for your families.

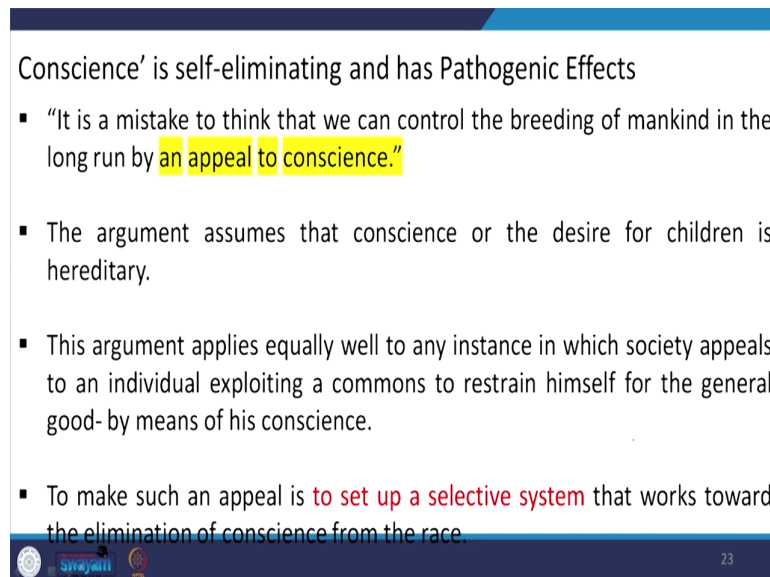
But, what happened in a welfare state like hours this situation cannot be tolerated; you cannot actually put yourself to starvation and death. So, the state as a welfare mechanisms, it will come forward to rescue and share whatever is left share the benefits share the goods and

service whatever is left. So, it does not happen the in the case of welfare state and the tragedy of the commons that is why happens.

So, the concept of freedom to breed with the belief that everyone born as an equal right to the commons is to lock the world in a tragic course of actions, that is you can say we do have specific legislations and the orders, we do have agreements as well, we do have evens protocols as well. If, you see the universal declaration of human rights it describes the family as the natural and fundamental unit of society.

And, it follows that any decisions or choice with regard to the size of the family must irrevocably rest with the family itself; that means whether to breed and how many to breed? It actually depends on any on your choice and your and your decision itself. So, no one is going to interfere in this matter.

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Conscience' is self-eliminating and has Pathogenic Effects

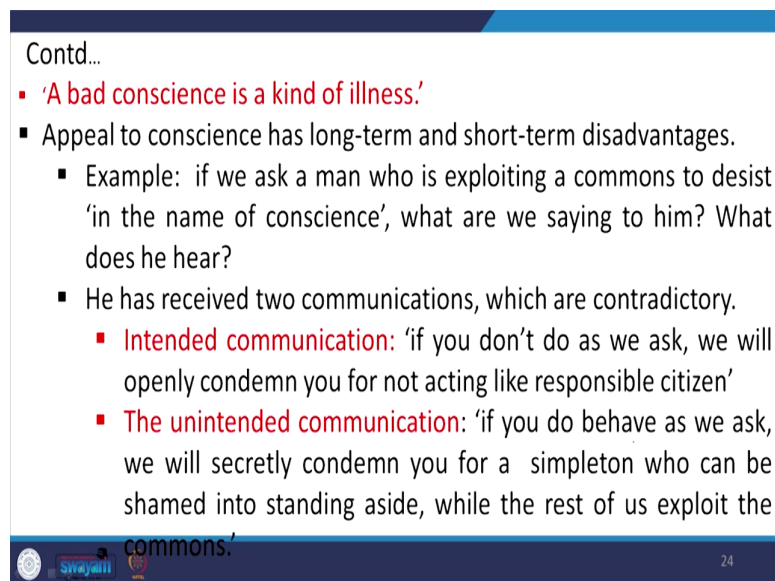
- "It is a mistake to think that we can control the breeding of mankind in the long run by an appeal to conscience."
- The argument assumes that conscience or the desire for children is hereditary.
- This argument applies equally well to any instance in which society appeals to an individual exploiting a commons to restrain himself for the general good- by means of his conscience.
- To make such an appeal is to set up a selective system that works toward the elimination of conscience from the race.

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So, in this context he talked about that we need to actually sic the conscience perhaps conscience is a factor, which can be helpful in solving this problem of population explosion and pollution as well. But, however, appealing to the conscience is a very difficult task and this argument applies equally to many cases like society appeals to an individual exploiting a commons to restrain himself from the general good by means of his conscience.
































So; that means, here if you have to appeal to the conscience of each of these human beings, then we need to see we need to setup a selective system, that works towards the elimination of conscience from the race itself. And, why again we are questioning about the appealing to the conscience, because sometimes a bad conscience is a kind of illness it can have pathogenic effects.

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- 'A bad conscience is a kind of illness.'
- Appeal to conscience has long-term and short-term disadvantages.
  - Example: if we ask a man who is exploiting a commons to desist 'in the name of conscience', what are we saying to him? What does he hear?
  - He has received two communications, which are contradictory.
    - **Intended communication:** 'if you don't do as we ask, we will openly condemn you for not acting like responsible citizen'
    - **The unintended communication:** 'if you do behave as we ask, we will secretly condemn you for a simpleton who can be shamed into standing aside, while the rest of us exploit the commons.'

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So, when you are appealing to the conscience, it has two effects one is one you can say, the first one is long term disadvantages and the second one is short term disadvantages. So, if you are trying to explain it that, what is the bad conscience and then it is leading to long term, disadvantages or short term disadvantages we can take this example.

If, you ask a man, who is exploiting a commons, that do not do. In the name of your conscience, because commons are degraded, commons are polluted, commons are losing their characteristics and which is not good, then what are we saying to him, what does he hear? So, here we need to actually analyze the answer, before taking any decision that, he has received two communications in this context for taking his decisions, that yes I need to be away from degrading this commons or I can go ahead.

And, these two communications are contradictory. The first communication which is known as the intended communication, that if you do not do as we ask, we will openly condemn you for not acting like responsible citizens. Then; obviously, if you are if we are asking requesting and you are not actually obeying the rules then; obviously, we will be condemned, we will be sometimes punished right.


So, this is the intended communications. The policy intends to bring this, but in this in this policy also, in this question also, in this request also, there is some on intended communications. What is the on intended communications in this case? In this example, that if you do behave as we ask will be you will secretly condemn you for a simpleton. Who can be shamed into standing aside while the rest of us exploit the commons?

So, what the society will be saying, that you just obeyed and others are crossing through, others are getting the benefits by not obeying the case, but you obeyed that is why, that is why you are not getting any benefit out of it. So, in this case the rational ah human being, now he will be thinking that, whether I need to access the commons or not, that is what the point is, then in this case what is the solution is it a case of mutual coercion forceful something should be there?

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Then what is the solution?- Mutual Coercion??

- **Mutual coercion- mutually agreed upon by the majority of the people affected.**  
Example: compulsory taxation
  - We institute and grudgingly support taxes and other coercive devices to escape the horror of the commons.
- An alternative to the commons need not be perfectly just to be preferable.  
Example: private property right with legal inheritance.
- We must admit that our legal system of private property plus inheritance is unjust- but we put up with it because we are not convinced, at the moment, that anyone has invented a better system.
- As alternative of the commons is horrifying to contemplate, therefore, injustice is preferable to total ruin.



Like your compulsory taxation, but sometimes we also do not like this compulsory taxations. Sometimes, we obey the taxation system grudgingly, we support it, but with hesitations, but we do not have anything to do that is why we have to pay the tax. An alternative to the commons need to be perfectly just to be preferable. And, the second thing is that in this context, that if you do not even have any interest in paying the tax, you do not have any alternative as well. If, there is no alternative to this commons then; obviously, you do not have any preferable choice that is why you have to obey the taxation systems.

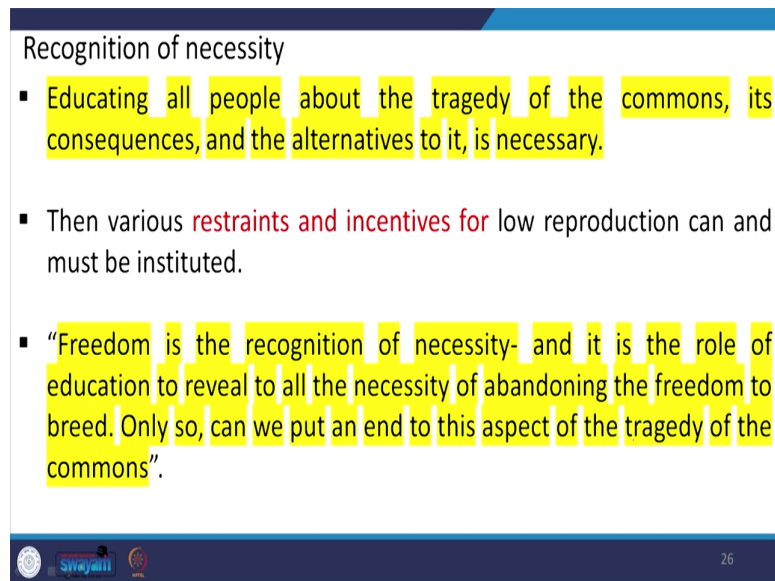
And, here he talked about that in this context we must admit that our legal system of private property plus inheritance is unjustified. Sometimes, we may think that this private property system is unjustified, as well as this inheritance is also unjustified in this private property right.

But, again what is the alternative? If, there is no preferable alternative then; obviously, whatever the system is there it must be followed.

So, in this context he again added we put up with because we are not convinced at the moment that anyone has invented a better system. So, in this context you can say, as alternative of the commons is horrifying to contemplate. Therefore, injustice is preferable to total ruin. May be you are saying that this inheritance system is a kind of in just, but sometimes and as there is no alternative to it then just injustice is preferable it is better than a kind of total ruin.

So, that is what you can say, whatever the existing alternative is available, out of it we just try to find what is the best? And, in his concluding remark that is why he talked about the importance of necessity. If, you are feeling that this is urgently necessary; that means, you are educated enough, educated enough means you know that this is urgent, this is important, for my survival or for something, which is very beneficial.

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Recognition of necessity

- Educating all people about the tragedy of the commons, its consequences, and the alternatives to it, is necessary.
- Then various restraints and incentives for low reproduction can and must be instituted.
- “Freedom is the recognition of necessity- and it is the role of education to reveal to all the necessity of abandoning the freedom to breed. Only so, can we put an end to this aspect of the tragedy of the commons”.

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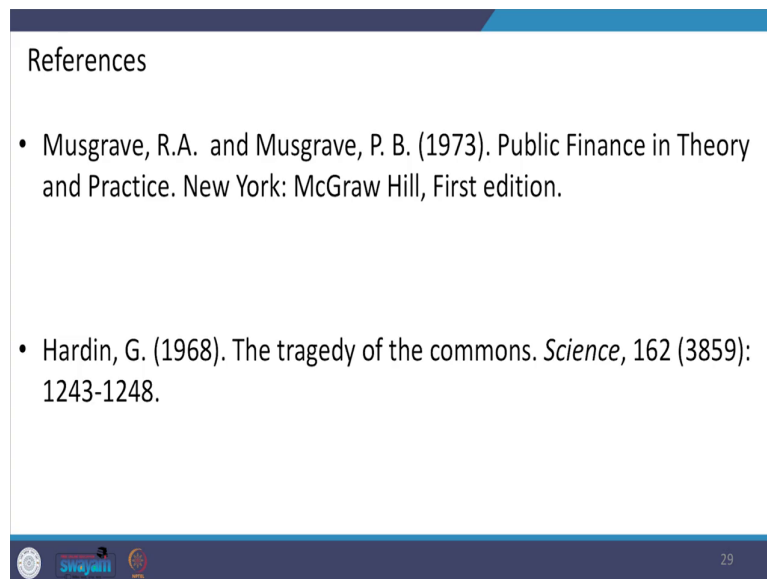
So, educating all the people about the tragedy of the commons, its consequences and the alternatives to it is very necessary for addressing this kind of tragedy of the common problems. And, moreover along with this educating awareness, creating awareness, creating different kinds of restraints, legislations, incentives for low reproduction, here or any kind of common tragedy of the common problem they can be or they must be instituted. Otherwise, this problem will be going and going.

So, in the concluding remark he talked about freedom is the recognition of necessity. And, it is the role of the education to reveal to all the necessity of abandoning the freedom to breed. Only so, can we put an end to this aspect of the tragedy of the commons. So, in this case we explained, narrated the very case of tragedy of the commons as put forth by Garrett Hardin.

In his work towards the collective choice, how to govern the commons? He talked about the situations and how to govern that it may be some kind of coercions, command and control, economic incentives, or creating awareness and educating the people, then we can say that this is what.

But, what is the evolution or what is the additions to it is there any other procedures methods or other kind of innovative ideas, that are bring in process or that we are developed after this point of time. So, furthering this evolutions and developments in this in managing this commons, in the next lecture we will be also talking about the second theory that is the collective choice and the governance

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References

- Musgrave, R.A. and Musgrave, P. B. (1973). *Public Finance in Theory and Practice*. New York: McGraw Hill, First edition.
- Hardin, G. (1968). The tragedy of the commons. *Science*, 162 (3859): 1243-1248.

And for this lecture we have taken the references from Musgrave and Musgrave, *Public Finance in Theory and Practice* in his in their 73 1973 article. And the second one the second



core article, that you need to follow that is the tragedy of the commons, which he had wrote he had written in 1968.

Thank you.