Plastic Waste Management
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Lecture – 23
Plastic Pollution Impacts on Marine and Wildlife

So, welcome back; so this is the third module for week 5 and we are discussing impact of plastic pollution on wildlife on marine environment as well as on human health and in general environmental issues associated with that. So, in the last 2 videos we have focused mostly on marine environment, in the first video we looked into what are the sources of plastic getting into the ocean and in the second video we kind of continued that discussion and then we focused on what is the adverse impact on marine environment from this plastic which is getting there.

So, in this third video we will finish we will have a small discussion on that which we are still left. So, few slides will kind of continue on the marine and then we move into wildlife and in general in terms of plastic from the land issue. So, from water marine environment will move to land environment where we will see how it is affecting wildlife and other animals as well so, let us begin.

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So, we were looking at which last towards the end you saw that video where you saw that bird was entangled in plastic and so similar things if you go on YouTube which I kind of encourage you to kind of research some research on your own as I said earlier. There is no book on this particular topic we are collecting lot of information from different sources and trying to put it all together and remember for every week there is a we have several reading materials, not only these slides these slides are available to you, but at the same time there are lot of reading materials are also available for every week.

So, you should refer to those reading material because there might be questions from those reading materials in your quiz as well as in your exam. So, as in continuation of the discussion what have been found at that almost 50 percent of the sea turtle has ingested plastic. So, more than like 50 percent of a sea turtle has plastics in their body. So, that is as per the WWF report of 2018 which is found there.

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When plastic is there in fish there are plastics there are some planktons and as you can see there are bigger pieces of plastic. So, as we have been discussing this week and also earlier that many times this marine environment species they actually get confused with plastic with thinking that plastic is actually the food and they eat they ingest this plastic pieces and which does not give the many energy it does not digest in their body. So, although it makes them feel full, but they are they do not have any energy source from these and that creates problem they even if they can even a starve. So, that is plastic is

showing up which has been reported in many studies now which you see the plastic in these species.

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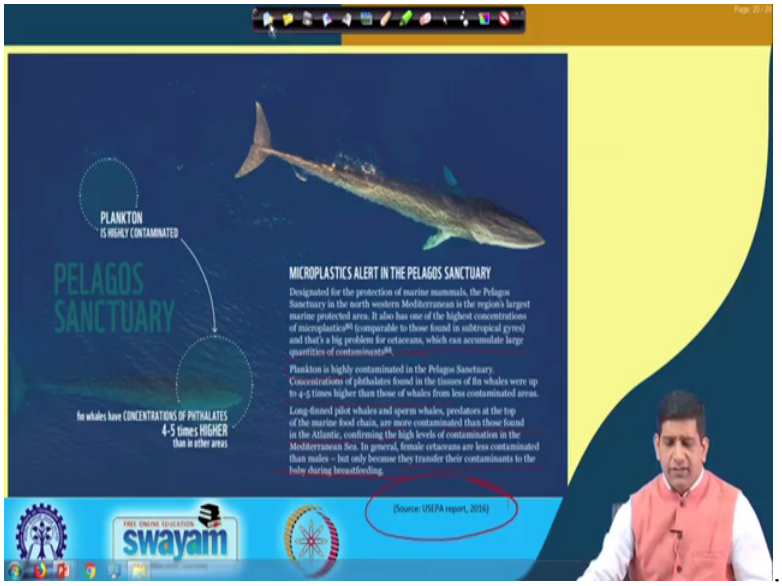

Now, planktons are is highly contaminated fin wells have concentration of phthalates 4 time 4 to 5 times higher than in other areas, micro plastics alert even in this particular centuries which is designated for protection of marine mammals. The Pelagos Sanctuary in is in the Northern Western Mediterranean is region's largest marine protected area and it is also one of the highest concentrations of micro plastics unfortunately.

So, it is a marine protection area, but we are seeing a lots of micro plastics showing up there and it is a higher sources of micro plastic and comparable to those found in subtropical gears and that is a big problem for large like it is showing it is a accumulating in a large quantities plankton is highly contaminated in this particular century concentration of phthalates in the tissue for whales is 4 to 5 times higher.

So, long finned pilot whales and sperm whales predators at the top of the marine food chain are more contaminated than those found in Atlantic confirming the high levels of contamination in the Mediterranean Sea. In general the female cetaceans are less contaminated than males, but only because they transfer their contaminants to the baby during breastfeeding; so things are also going from female to the babies.

So, this is as per there was a report by USEPA 2016. So, as you can plastics are getting into many of these sea animals and sea life and which is being reported in different studies right now.

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And you may have seen this kind of pictures like more than 90 percent of the seabirds of fragments of plastic in their stomach and by 2050 that is as of like, this is 2018 data which is the last years data and by 2050 this number may rise to 99 percent. So, that would be a huge number 99 percent of the sea birds will have plastic in their stomach. So, think about that close to almost 100 percent of seabirds will have plastic in their stomach.

So, this is again part of the WWF report of 2016 where we see this plastics getting into the ocean, as you can see here the starfish actually just lying on top of what looks like a keyboard old style keyboard which is showing up at the bottom or maybe a calculator which is showing up at the bottom where you can you can see things are making way into the ocean.

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And global how much if you put that in a monetary forms in a monetary angle again these are from the same WWF report and we will put this report as part of the reading material. So, those of who are interested to go and look at more detail you will find it there it is it is in it will be part of the reading material.

So, global economic cost of plastic pollution US dollar if you put it in US dollar 13 billion dollar per year. So, that is the damage to the marine ecosystem and there is a financial losses to fisheries and tourism because with all these plastics it does affect fishes, it does affect the tourism and if you look at the fishing lines are causing 65 percent of the entrapment in Mediterranean area. In Mediterranean species 344 species trapped globally of which 35 percent is bird, 27 percent is fish, 13 percent is marine animals, 20 percent is invertebrates and rest is others which is provided there.

So, it is affecting all the different types of species birds, fish, mammals, invertebrates and it is causing 65 percent of entrapment in the Mediterranean which is the fishing line which is causing that. So, lot of impact a lot of impact from this plastic in terms of a plastic pollution on over in the sea.

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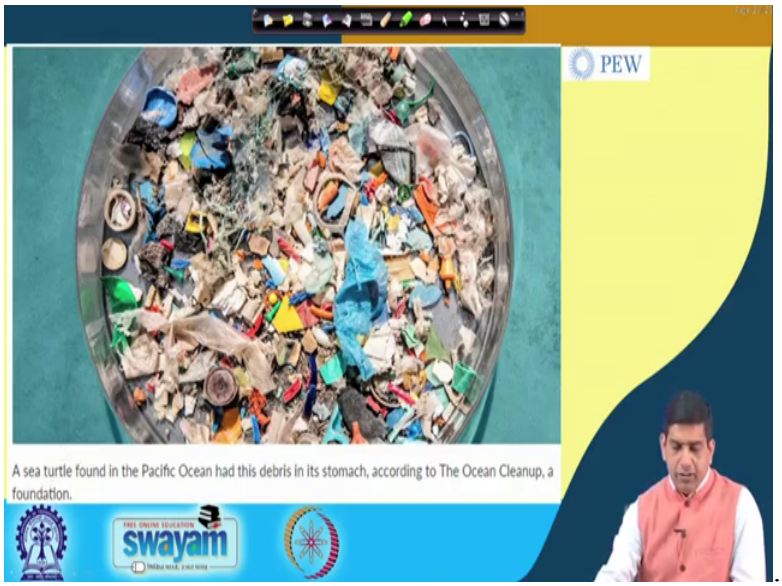

And a sea turtle there was a sea turtle in pacific ocean when it was operated on in the stomach of sea turtle all these plastics were found as according to the ocean clean up a foundation which does the ocean cleanup the these plastics were found inside the stomach of a sea turtle.

So, whatever the picture you are seeing over here is what was inside the stomach of a sea turtle. So, think about all the different types of plastic you see lots of plastic pieces here, different types of plastics, some toys maybe some toothbrush kind of stuff some is small lot of variety of stuff and since they are got broken down we do not really know what they are what because we have to put them all together to see the what product it was it.

But looks like pieces, pieces coming from toys, pieces coming from bags and pieces coming from different things like some fishing lines, kind of stuff some nets, some decorative items, some plastic bags, again different colored and as you can see they are not only one type of plastic it is a mixture plastic, different types of plastics making it to the ocean and eventually getting into the sea turtles stomach. So, this is what is came out from a sea turtles stomach.

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Dolphin with a plastic bag trailing in from it is fins swims in the Fernando de Noronha Archipelago in Brazil. So, you see here it is a huge polythene bag and it is a bag which is dolphin got the bag is a stuck is trailing with it is a fin swims there. So, the bag is showing up and then eventually this bag may be taken up thinking as a food.

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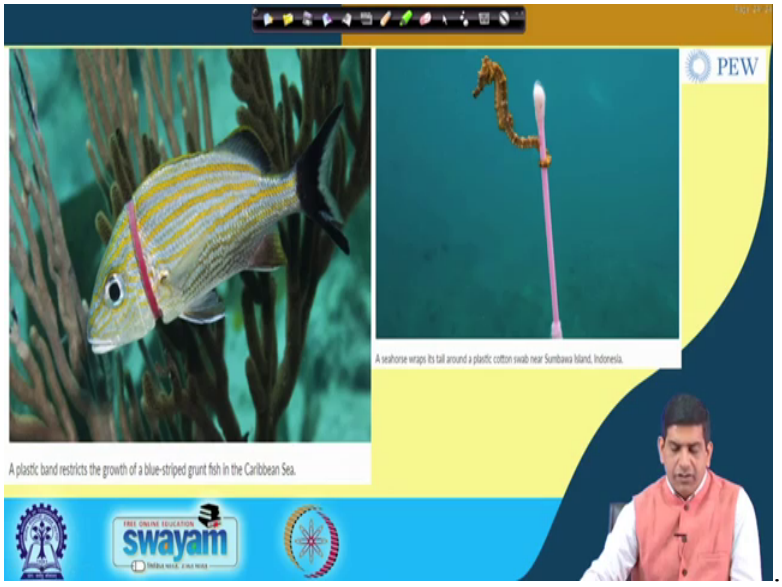

A plastic band restricts the growth of a blue striped grunt fish in the Caribbean Sea. So, you have this plastic band around the neck which creates a problem. This is on the right hand side what you see it has been a like a global picture and also national geographic

has a picture as well where the seahorse wraps it is tail around a plastic cotton swab near Sumbawa island in Indonesia. So, that is kind of all it looks kind of source what is happening in the ocean where this plastic cotton swab is there in the ocean then seahorse is wraps it is tail around it. So, that is and you see those showing up in particular and so, these are like different ways things are showing up in the wild in the ocean.

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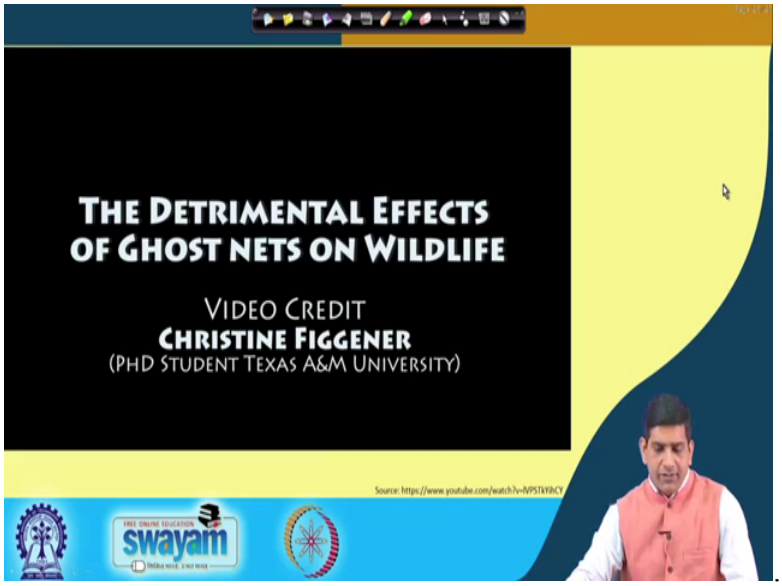

So, this we will look at this video again which kind of so, some of the detrimental effects of the nets on wildlife and this was done by some student in Texas A and M. The video here you will you watch the video in between the video has since it is in Texas A and M there are some part of it may sound like being in Spanish and there are some Spanish sentences.

But do not worry about that they do have English English is there mostly, but since the students seems to be from a Spanish background they are talking part of it in a Spanish too, but you do not have to worry too much about what they are talking what is the more important is the visual. The video part is more important of course, the audio is there for you to listen and, but do not worry too much about those Spanish languages which show up once in a while.

So, it is English video with some Spanish languages in between. So, let us watch it and then I will discuss about that in a once this video gets over.

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See (Refer Time: 12:11) I have my (Refer Time: 12:13) I mean oh we can move [FL] see [FL] [FL] my out of my ((Refer Time: 12:39)) [FL] and get the (Refer Time: 12:48) ready because (Refer Time: 12:50) this. In fact, [FL] [FL] I need somebody to [FL].

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Go easy [FL] [FL] [FL] well done hm [FL].

So, as you saw in that video it was that the turtle which had nets attached to it is one of the kind of one of the arm one of the leg had nets lot of lot of strings attached to it lots of

ropes attached to it which was creating problem for them and at the same time around it is neck you saw that they were trying to put it upside down. So, that they can cut those net and if you watched it carefully around that neck there was a lot of there was lot of kind of wound as well.

So, it is they were basically they will try to do some treatment or the wound and then release it back into the sea. So, this is one example of the turtle and if you watched carefully there was another turtle on the right hand side which has which had similar problem as well which the video was not focused on that.

So, this is just to illustrate a point that this is what we are talking about this entanglement entrapment this plastics getting into the day to day affair of these marine life or the wildlife and creating problem. It is creating the problem it is damaging to their health this things wrapped around their neck in for this turtle could have been there for many days and that was not at all good for it is had not been caught. And looked into it may have led to maybe fatality for this particular turtle as you can see that it was really very badly wrapped around it is neck

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So, that is just to so, illustrate the point which I have been trying to make in those slides so, in between I am just showing you small videos to illustrate the same thing and so that it reinforces that the concept that we are trying to cover. So, in terms of the ingestion what is happening if you look at this particular graph over here this particular study

which was reported in a journal by Springer and this is done the title is deleterious effect of later on marine life by done by Boltzmann et al in this Marine Anthropogenic Litter journal in 2015.

So, as you can see the number of species so what they have try to do is a plasticized animal species. So, in terms of the ingestion and here it presents the number of species with documented reports of marine debris ingestion. So, they went around and did lot of sampling for different marine life and then they looked into how many of them has like a plastics inside their body and they have ingested plastics.

So, what they found was ducks marine ducks 7.7 percent, divers 60 percent, dugongs and sea cows 60 percent, true seals 21 percent, penguins 28 percent, invertebrates around so these are actually not sorry I am it is they are not percent they are they are actually yeah these are the percent and then they here we have some numbers as well.

So, invertebrates more than 0.001 percent, whales 54 percent, turtles almost 100 percent, you saw turtles video just before seagulls 62 percent, pelicans gannets and boobies and tropic tropicbirds 24 percent, toothed whales 62 percent, gulls, skuas, terns and auks nearly 40 percent, albatross and other procellariiformes nearly 60 percent and then you have the fish which was around 0.3 percent. So, we have it is called plasticized animal species.

So; however, all these animal species are showing plastic in them, some more some less based on the numbers that they have looked into and they found that these are the different percentages in which they found the plastic was present in there the body of these animal species. So, that is that is kind of a concern that plastic these many of these animals are not able to differentiate between plastic and food and they are ingesting this plastic.

Thinking that it is a food material and that can lead to a lot of problem in terms of it is starvation, in terms of all the chemicals from plastic getting into their body getting passed from one generation to another generation and then it may have impact on overall the species development as we progress because things from plastic, there are certain chemicals from plastic which are really harmful which we will talk about as well and later in this particular week.

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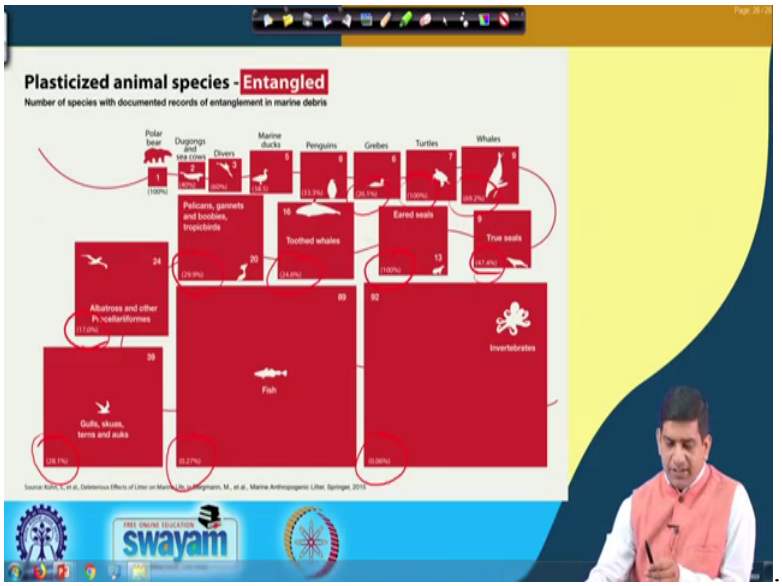

So, and so that was how much was there in terms of ingestion, then how many of these from the same paper same study they also looked at how much of the animal is this species are entangled with plastic. So, number of species with documented records of entanglement in marine debris. So, here they found so here the some of those are numbers are not that high. So, for example, they had only one polar bear and it was entangled so it becomes 100 percent.

So, but so you have to understand that there are certain limitations of every study including this study so there was only 1 polar bear and it was found to be entangled. So, they did had nearly 40 percent for dugongs and dugongs and dugongs and sea cows, 60 percent for the divers, nearly 39 percent for marine ducks, 33 percent for penguins, then they had grebes which is 26 percent, turtles again 100 percent, whales 70 percent, true seals 48 percent, eared seals 100 percent and they were 13 of them toothed whales 25 percent, pelicans 30 percent, fish 0.27, gulls, skuas and terms they were 28 percent and then invertebrates 0.06 percent and albatross and other poly it was 17 percent.

So, as you can see again there is a variety some total leads the pack with 100 percent and same thing with eared seals and, but there are others which are very very low as well. So, this is number of documented records of entanglement in marine debris where this these species were entangled with plastic when they were they were like studied upon they found them to be entangled with plastic.

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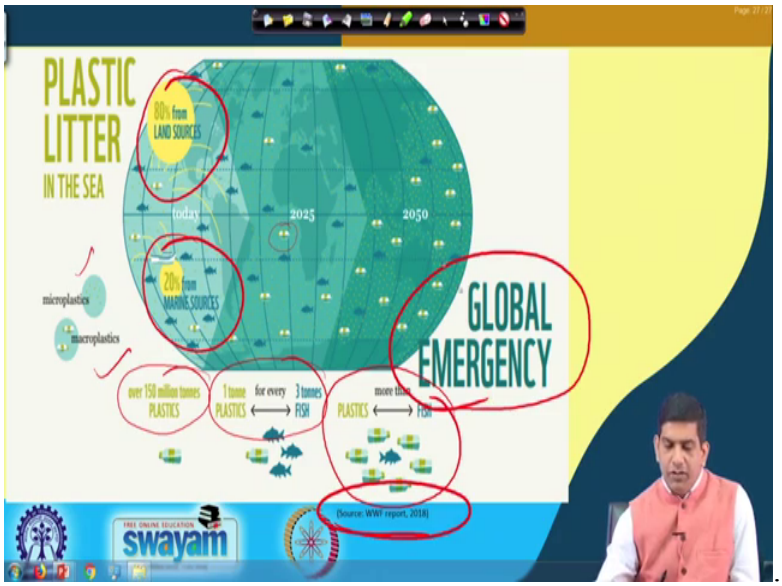

Now, if you look at the plastic litter in terms of how much it is into the into the ocean we are saying around as of now as of today again when we say today most of these will be kind of a data year or too old because data gets collected put into a report then the report comes to the public domain.

So, this is the report from 2018. So, I assume the data will be of 2017 or something like that. So, it is again the same WWF report which is there in your reading material. So, if you so plastic litter in the sea 8 percent is coming from the land sources, 20 percent is from the marine source. There are micro plastics, macro plastics as you can see in the picture here, micro plastics lot of smaller dots you see a lot of if you look at carefully lots of smaller dots all across the globe.

Macro plastics is the these ones and they have been kind of documented that they are also there, but it is we are seeing more and more of micro plastics right now and over 150 million tonnes of plastics which is there, one ton of plastic for every 3 tons of fish that much plastic is getting into the ocean and plus so, at in 2015 we will have more plastics than fish.

So, right now we have a one third one ton of plastic for 3 ton of fish and since we are doing lot of fishing is also we are all kind of over fishing and we are at the same time we are having more plastic going into the ocean. So, by 2050 we will have pretty much more plastic than fish or more or less the same number. So, that is kind of the we are talking

about the global emergency where we need to kind of look at this issue so that that does not really happen. So, we need to arrest them that particular problem today.

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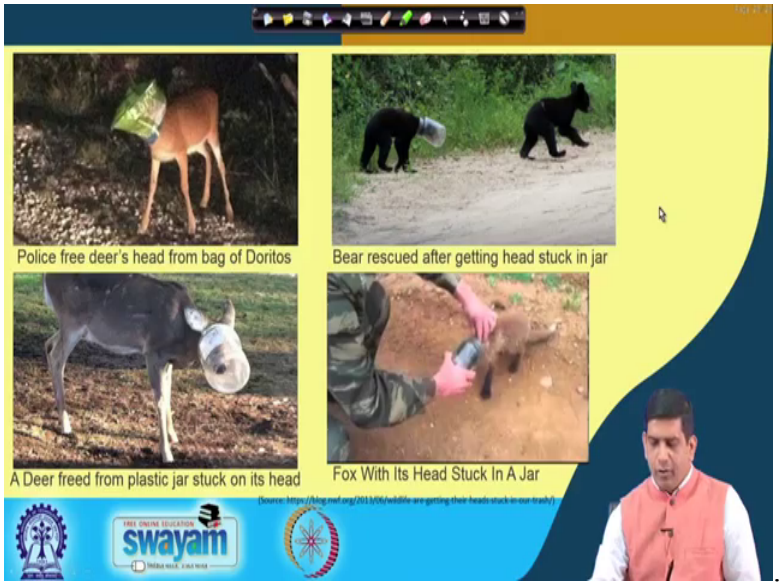

Some of this wildlife for the land issues there have been you will see that many of times deer got entangled with a bag of Doritos and it just got into the head, deer freed from plastic jar is stuck on it is head, bear rescued was stuck in jar. So, that is those plastic jars and the fox with the head stuck in a jar. So, those are we see if these kind of things from time to time reported also on the social media, we see lot of video showing up from time to time where this plastic is impacting the wildlife and we are getting these issues coming up in terms of plastic creating problem for there. For regular kind of regular living of these wildlife in their in their own area it is since the plastic goes into the forest into the wild areas and that creates problem for them

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For example, in Thailand the plastic waste crisis monkeys are drink from coca cola bottles and suffocate inside carrier bags. So, it is they like that is why many times those this thin bags if you look at carefully it says keep away from children things you may suffocate from these bags.

So, you do not need you have to use that bag very carefully you should not put it on your on the head, but many times these animals they do not have that much like thinking ability and then it creates a problem for them where they get entangled they get suffocated inside the carrier bag.

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There was a report just early this year just on January thirty first of 2019 where the plastic waste from Sabarimala devotees kills wild animal in Kerala forest. So, it is a we were looking at plastic getting abundant in forest. So, 40 year old female elephant was found dead with 2 kg of plastic waste in it is stomach in it is bowels in a forest near holly hill Sabarimala in Kerala.

So, the plastic articles consumed by this was believed to have been left over by 2 month long pilgrimage that happened in Sabarimala which concluded in December and that it was they found that carcasses of that animal that jumbo under wildlife area and when the veterinarian looked at the animal they found that it died of constipation and intestinal blockage because it could not digest the plastic in the intestine or take any other food.

However, no similar instance have been reported through the plastic wastes are found in the dung of wild animals before. So, they have this is what the first which was kind of reported which was found out so, but these are this is a problem in terms of plastic getting into the animals body.

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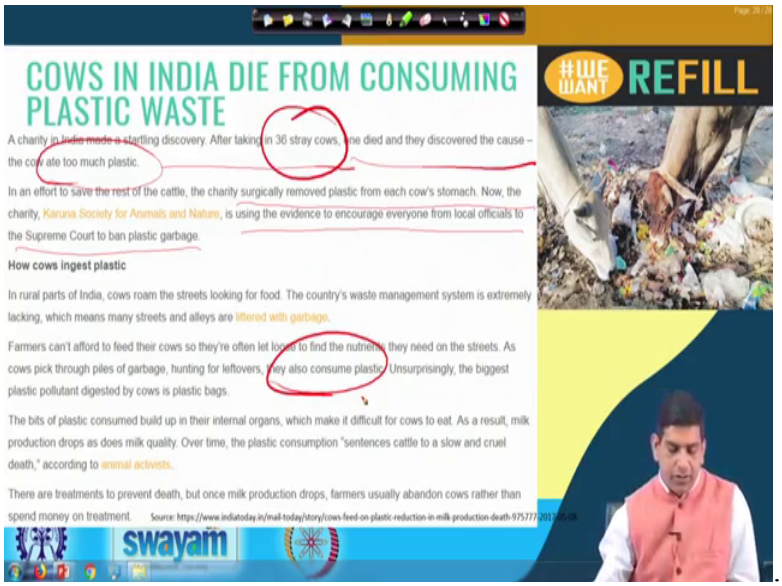

Cows in India died for consuming plastic waste that is again a big problem not only cow is dying from plastic waste since the cows are consuming as you can see from the picture on the on your on the top over here and the many pictures from in waste disposal sites, at the landfill sites, at the dump sites, where the cows are eating the food waste at along with from the municipal solid waste sources and that food waste many times is wrapped around with a plastic bag and that creates problem in terms of plastic getting into the cows body and chemicals from plastic can get into the milk as well.

So, think about all that since I am setting say we all that milk based sweets and products we may get traces of this plastic showing up the plastic chemicals showing up there. So, that is a big problem and the plastic getting into the cows body which does not degrade. So, they had looked at there was one this report which came out to charity in India made a discovery that after taking 36 straight cows 1 died and they discovered the cause the cow ate too much plastic. So, for save the rest of the cattle the this the surgically removed plastic from each causes stomach now the charity which is karuna society of animals and nature using the evidence to encourage everyone to supreme court to ban plastic garbage.

So, again that is my it is rather than how to ban plastic garbage I do not know, but because I would rather say that we should focus more on managing this plastic waste which managed that plastic waste properly and try to not use the single use plastic bags

those thin bags and other stuff which creates problem which could be the cause here as well to not to use them as much as possible.

So, how cow ingest plastic in rural parts cow roams on the street for food the countries waste management system is extremely bad as we all know so many our areas are littered with garbage farmers cannot afford their cows to feed. So, they just let it go on the streets and cows pickup piles of garbage hunting for leftover they also consume plastic and as we are talking about earlier and biggest plastic pollutant digested by cow is the plastic bags mostly those thin bags and the bits of plastic consume build up in their internal organs which makes it difficult for cow to eat.

So, milk production drops as does a milk quality and that plastic consumption sentences cattle to a slow and cruel death. So, as per the activists there are treatments to prevent death once milk production is stop formally usually abandoned cows rather than spend money on treatment. So, that is that becomes like an economic issue there. So, let us look at this issue of this cow where one bull was actually treated was operated on to remove this plastic bag and this is from one of the scenario in India where it happened and then we will close this video for this particular module.

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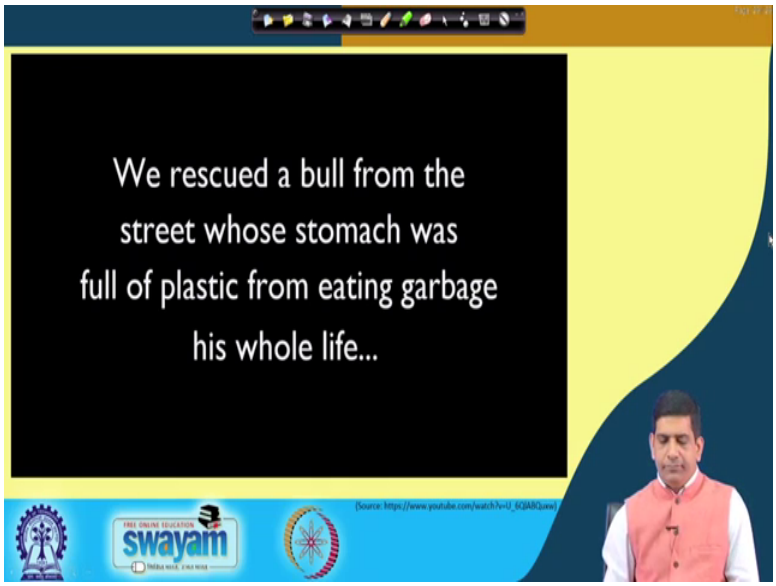

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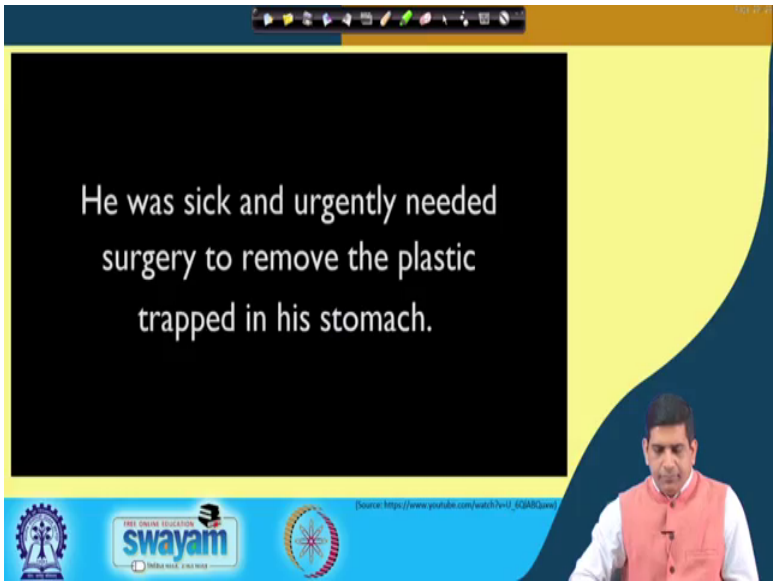

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So, as you saw that the particular bull had so much plastic in there in it is stomach. So, if they it was not rescued if they had not removed this plastic from it is tummy and this bull will feel full all the time because the tummy is already full. So, it will not feel like eating, but it will not get any energy.

So, what will happen it will starve and then it will die and say similarly had it been a cow with all this plastic in the stomach and so again the milk production will go down and whatever is the milk there if the little bit of this plastic whatever the plastic is there if the chemical is leeching from this plastic into the into the body that may potentially make way to the milk the milk quality will go down and will be consuming those traces of chemicals traces of contaminants from plastic into our through milk in our body as well.

So, that is why it these are the these issues are very very important that is the reason why plastic waste is getting lot of attention. So, it is management of plastic waste is a huge problem that is the reason why this course is to raise awareness on this particular issue, as I said earlier we it is a brand new topic with a brand new course with hardly any, but there is no textbook available.

So, we are just kind of collating information from different places and trying to present to you the issue and any comments you have any feedback if you have if you know of some other better reports or any even it does not have to be a better report or any other source of information that you would like to share for our enrichment in the subject area

please put it on the discussion board who put the link on there so that other students can benefit from that as well.

So, again I hope that you are enjoying this course and so far and we will continue our discussion further in terms of the impact of plastic improper management of plastic on wildlife and what is the impact on human health and environment in subsequent videos.

Thank you.