Plastic Waste Management
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Lecture - 19
Plastic bans - China Sword Policy Impacts

So let us get back to our discussion on this China sword ban, which we were doing in this previous video as well. So, we will continue in that discussion in this particular video and look at some of more data in terms of, the impact of this ban in China and some data comparing what was happening before and after in terms of this ban, focused on plastic waste. We are not talking about other waste stream, if you are interested in other way stream the same UN report, which we have in every slides.

These actually came from a report done, based on some on UN website; it is available and we will put that on as a reading material, but for in every slides, you can see there is a link at the bottom and if you go to that link, you can find the information for other waste streams as well, because it is not, the ban is not confined only to plastic, it is also it does impact other waste stream too.

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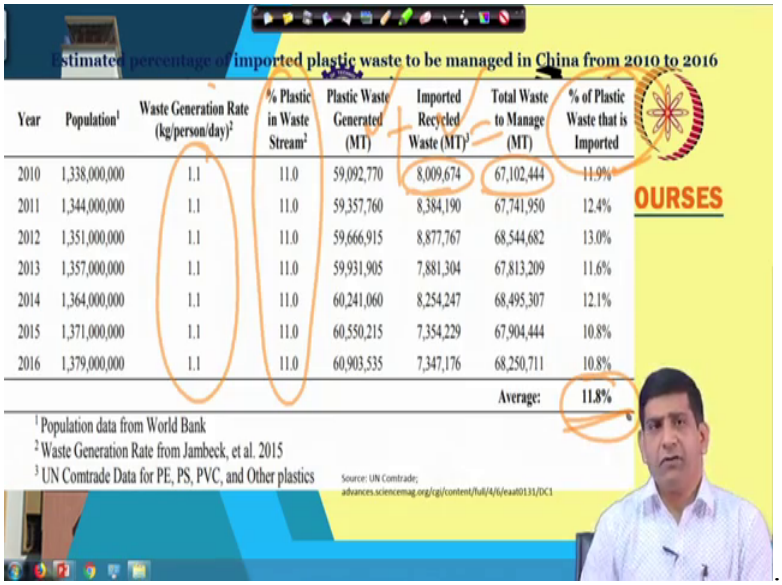

So, a similar table which we were looking at earlier; so there have been some calculations also been done in terms of how much waste was really imported by China.

So, this they took the data, population data from World Bank, Waste Generation Data came from this particular paper by Jambeck at all from 2015 and then there was some UN data on polystyrene, polypropylene, PVC and other plastics. So, based on that there has been an estimate has been made, this is an estimate in terms of what is the plastic waste generated in the waste stream and so if you look at the total numbers here, that comes out to be 11.8 percent, which is like 12 percent.

So, this is the percentage of plastic that is imported that is being managed in China. One thing you would, you should notice here, the percentage of plastic in waste stream has been kept constant at 11 percent, which is not really will be true, because it as we have seen in Indian contest as well we are getting more and more plastic getting into our waste stream.

So, we are presently way in India we are at around 10 to 12 percent. So, earlier in 2010 probably we are 6 to 6-7 or 8 percent. So, we have almost doubled our plastic waste volume, plastic waste, the quantity of plastic waste in the waste stream within the country over last, I would say maybe a from the last 15 years or even less than that time period.

So, and then waste generation rate is also kept constant here at 1.1 kg per person per day, which is also not really real usually does not happen, but keeping all these seeing you when you do some calculation you make some assumption. So, keeping all those factors and assumptions in place they have calculated how much plastic waste is generated, how much is imported and the total waste that is managed, which is this plus this will be, you will be equal to that.

And then based on this how much is the imported. So, this you take this number divided by the total and then multiply it by 100. So, that is how you get this these values the percentage of plastic waste that is important and that is around 12 percent. So, 12 percent of the plastic waste managed in China. Before this Chinese sword ban was essentially the imported one. So, 100 kg if they were managing 12 kg was coming from outside China.

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Ranking	Reporter	Income Level	Region	Imported Plastic Waste (MT)	% of Total Imports
1	Hong Kong	HIC	EAP	1,778,898	24.9%
2	Japan	HIC	EAP (OECD)	842,104	11.8%
3	United States	HIC	NA (OECD)	693,444	9.7%
4	Thailand	UMI	EAP	431,783	6.1%
5	Germany	HIC	ECA (OECD)	390,106	5.5%
6	Belgium	HIC	ECA (OECD)	323,308	4.5%
7	Philippines	LMI	EAP	320,105	4.5%
8	Australia	HIC	EAP (OECD)	293,122	4.1%
9	Indonesia	LMI	EAP	189,273	2.7%
10	Canada	HIC	NA (OECD)	189,161	2.7%
	Top 10 Total			**5,451,304**	**76.4%**
	World Total			**7,134,966**	

Now, that number has gone down, because of this particular ban. So, the countries which were sending plastic waste top countries that exported plastic waste to China in 2016 they started from Hong Kong, Japan, ginneries US, Thailand, Germany, Belgium, Philippines, Australia, Indonesia, and Canada. So, this total top 10 total was close to 76 77 percent.

So, this much amount of plastic waste coming in. The thing that is coming from Hong Kong is actually part of it was also coming from other countries. So, it is not only generated in Hong Kong, it is generated somewhere else, but it is channeled through Hong Kong. So, that is why you see a pretty big number over there, although the Hong Kong population is not as high as other countries that we have on this list over here.

So, but around 70 76 77 percent of the plastic waste that was coming to China imported, that was getting imported into the China or exported to China was coming from these top ten countries, which is listed over here.

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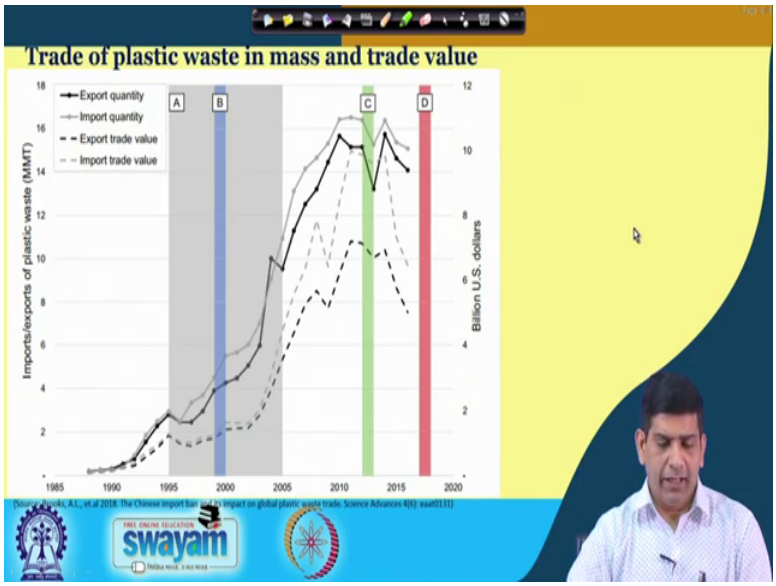

Now, in if you look at the trade of plastic waste in mass pass trade volume, where initially you have you are looking at the export quantity, you are looking at the import quantity, then export trade value and the imported value.

So, those export and imports are your dark lines, like your firm lines, which with export being the dark line and the import being the gray line and then trade values are again seams colors as for export and import, but here the lines are dotted lines that we see over there.

So, as you can see there is a in terms of quantity there is increase in quantity, in terms of import exports of plastic waste you see an import the numbers are going up. Similarly, numbers are also kind of going up for the import part too.

And for the trade values, for the export trade values you see kind of a increase then there is there is a dip a little bit and similarly the import rate value also there is a dip. So, what does that mean is; although based on the market conditions you will you do see fluctuations of up and down in terms of mass as well as the and corresponding the trade value for this plastic waste. And there are certain external factors in terms of policy, in place plastics are not the packaging, most of the many of these plastics are coming from packaging, the packaging is getting lighter.

So, you have those kind of impacts with this China sword ban. Now, you will have a sharp decrease in the number. So, that is why you see towards the end most of these lines are kind of having a decrease, because of, the impact coming from this ban.

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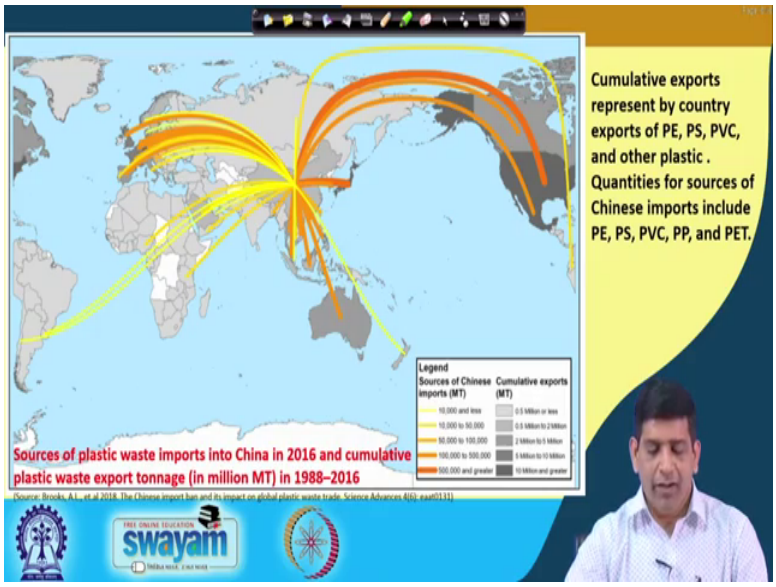

Now, if you look at the source of plastic waste coming to China in we, if you remember one thing if you have noticed one thing we are all looking at 2016 numbers, which is just before this China ban actually came into effect. So, we can compare how the things where. So, as you can see sources of Chinese cumulative exports and imports.

So, this is the cumulative exports represented by country; exports of PE, PS, and PVC we Polystyrene, Polyvinyl, PVC, Polyvinyl Chloride and Polyethylene, another plastic and then quantities for sources of Chinese imports also imports for these. So, these are as you can look at here. So, we have a sources of Chinese imports as well as cumulative exports.

So, accumulate those are the difference, if you look at the map they have been given different shades for different countries and then states are based on the cumulative exports number as over here. This cumulative export numbers the different sates as you can see which 10 million or greater is given darker shade which you see the United States including Alaska, then you have slightly lighter shade is 5 millions to 10 millions, then we have 2 millions to 5 millions which seems to be the shade for Australia, then and similarly, I think the 0.5 to 2 million is the same given to Canada.

And as you can see there are some countries which does not have data. So, there is no shade over there. So, these are the cumulative export values and the sources of Chinese imports, those are you see those different arrows are different wire these wires like import coming from US to China and for different places in from US to China. So, this is the sources of Chinese imports coming in from pretty much, you see the most of the developed countries is covered over here, in terms of waste coming from developed countries to China and thicker the line more and more waste lighter the line, thinner the line less waste.

So, that is how it has been presented over here. This is the sources of plastic waste imports into China in 2016 and the cumulative plastic waste expos tonnage. So, that is what again the value is from 1988 to 2016. So, that comes from the Brooks al et al paper.

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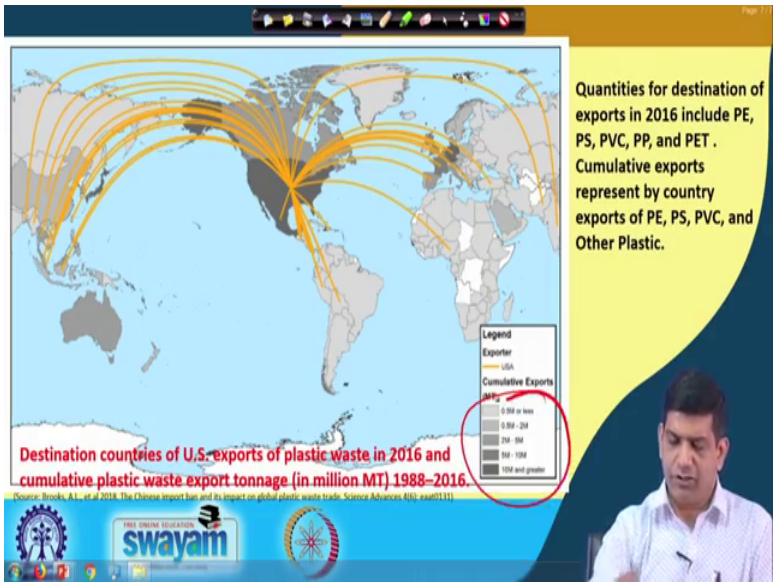

Now, the destination countries for US exports of plastic waste. So, if you look at US being one of the biggest exporter of recyclable plastic waste material. So, if you can look at where they are ending up. So, you see the China is a big, where they could do go to China.

We also get a good amount coming to India which you see a part of it is going to India as well and so, China, India and there are several countries you see over here and which Pakistan also, I am not sure yet that Bangladesh, Burma and many of these like

Indonesia, Malaysia and all those countries are there as well; some South American countries, Latin American countries that is where also it ends up.

So, as you can see a plastic waste from again from US going into different countries for processing, resource, recovery and all and in this map as well darker the shade and this cumulative export numbers are provided. So, that is which means darker the shade that we have more and more values over there, which kind of source up with the map as well.

So, that is and then if you look at from Japan destination countries of Japanese exports of plastic waste and the cumulative from again 1988 to 2016. So, from Japan also we get things coming to India, things going to other African countries, things go into China, things going to some other countries and also there are some exports to US as well, which maybe for a possibly specialized kind of plastic waste to be managed.

So, this is higher about US, Canada, or other countries more, but we do not hear about lecture Japan, Korea and those countries so, but Japan also has a lot of imports of waste going into other countries from their own land. Now if you look at Germany, similar stuff as you saw for US to China and other countries. Similarly, we see from German exports of plastic waste, same color code, color combination, same color shades and then you see the waste being sent to variety of places across the world.

Mexican from Mexico if you look at issue for Mexican exports of plastic waste and cumulative plastic waste export tonnage. So, from Mexico part of it does go to US and for some kind of a processing there over, from and some goes to Canada as well and part of it comes to India and you see in Africa and so, there are waste travelling. So, European union also maybe for some specialized recycling. So, wastes do travel there is a lot of waste travel as you can see the travelling of Mexican plastic waste in different parts.

Again similar example for UK, will not spend too much time, but you can have a look at it UKs as you can see from UK again waste going to several places around the world and where the waste is being managed. So, being said that we will just have a look on what different scientists are thinking about having at the impact of this plastic, waste plastic imports and we will discuss that. So, let us look at a very short video on this one and then we will talk about it.

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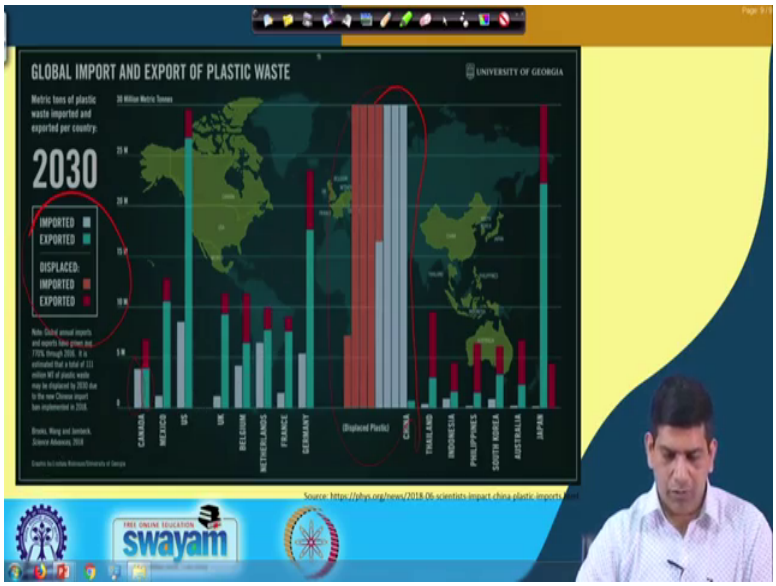

So, here as you can see, this was done by University of Georgia and it talks about, it presents to you the global import and exports of plastic waste and this is the numbers, as that the years are changing on the left, kind of giving the future projections and if we can stop it for a minute so, and then if you can look at it. So, here we are what we are looking at is global import and export of plastic waste.

So, it is the way. So, if you think about what will happen in future in 2030. So, we have different colors, if I would request you to look at this a bit carefully over here, oops. So, if these are the we have the import and export, then imported and exported then there are certain displaced. So, here the global annual import and exports have grown by around 770 percent through 2016.

So, it is estimated that there would be a 111 million metric ton of plastic waste will be displaced by 2030 due to the new Chinese import ban implemented in 2018, because of the Chinese import ban we will have 111 million metric ton of plastic waste. Rather than going to China it will go to some other place for management; so that is in terms of playing the projection. So, where the waste; on the left hand side we are looking at in terms of like a imported plastic and exported plastic and those are imported is light blue or light blue color or like you can say even like a light grey, light blue. This is the important part that we are looking at and then exported is the green part displaced, in the displaced category.

We have imported as well as exported. Now, the imported has been given that light reddish color and the exported is the dark red color. So, what this particular picture which is presenting to you is the global import and export of plastic waste, it is the metric ton of plastic waste imported and exported poor country. So, how much is being imported as well as being exported.

Now if you look at Canada, it is importing certain plastic and it is also exporting certain plastic container and in terms of the displaced plastic, because of a plastic that was actually going to China earlier, there is a sizeable number of plastic, which is your dark color or dark red color, which is getting displaced it is rather than going to China. It has to be managed in some other way.

Similarly, you can look at the other countries too. So, you can look at the other countries in terms of the Mexico US, UK, Belgium, Netherlands, France, Germany, some examples here. Now, in terms of the displaced plastic, because since it is not going to we have it is, getting in China, Chinas term we were getting lot of plastic coming in. So, we will have its still some plastic the cleaner ones coming into China and there would be certain import. So, you see a huge amount of plastic go, waste coming in and there would be some plastic waste, which is getting import exported from China too.

So, that is a the values over there, you see all that values coming this is actually for the China part, then we have Thailand, Indonesia, Philippines, South Korea, Australia and Japan. This particular paper which was done last year does not include our India is not included over there. So, that is basically is trying to tell us that based on the China's by ban on plastic, there will be an impact on how the plastic will move around the world and different countries will get impacted.

So, if we can continue this video a little bit more let us see, we can go back to that nopes, sorry, we will go back to that particular video. Just a second, you can go back to that yes. So, if you can go back to that particular video. So, here what you are seeing is the imported and exported. So, that is what you the values we are seeing how much the import is coming, how the exports are going and that will go right up to 2017 and now, here you start seeing the displaced, because where you have this plastic which is was going to China earlier.

So, these are all imported plastic coming to China from, but now, we will have as with the China sword policy, you see those numbers they started showing up where this is actually, going into the other countries too. Earlier, it was all coming to China it has to be managed within the country or has to go to some other countries. So, that is pretty much try to talks about and then will try to talk this in this particular slide as well. So, what is the implication?

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So, what we are; now, looking at what is the implications of this China's sword policy. So, now it would be increased investment in countries where the waste material originates as you saw in that particular small video clipping that even the waste that is being produced. They started looking at that is why you started seeing those red bots; that means, that waste is being managed there itself. So, those wastes rather than going to China is being managed itself.

So, the US and Europe are improving their capacity to recycle resins and with the new supply of volumes of polythene impacting the global balance, more volumes from domestic recycler could impact the price, new recycling facilities in other Asian countries, this also gives an impact opportunity for some other Asian countries to develop good recycling plants in their own country.

Country like Malaysia, India, Indonesia, Vietnam, who are second in line recyclers are likely to benefit from China's waste ban. If it is done properly these countries are expect

to consume a greater percentage of recycle polythene in domestic market and so, that will impact the Virgen polythene consumption, but again this has to be done in a proper manner, not in the informal sector with all those environmental damages. If it is done properly, it can have, we can get some of this US and other companies, finance some of those plants which runs properly in Indian context and we can recycle those plastic materials. So, that we do not have to go for virgin material.

So, and then there is also increased demand for feasible alternatives. So, this is the sort of impact of this immediate block on material will likely cause a dramatic increase in demand for existing alternative treatment solutions, such as incineration and landfill, because of decrease in available global capacity for recycling.

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So, those things are going to happen. Virgin resin demand to rise in China, because China is getting less and less plastic coming in, so there will be rise in virgin demand this ban will help reduce the waste accumulated locally in Chinese consumption and the volumes are smaller, but the net effect is that China is expected to consume a greater percentage of virgin plastic. So, they will have more and more of virgin plastics coming in and the waste import ban will lead to higher operating fees for Chinese assets which will lead to higher prices in the region as well. So, that will be there.

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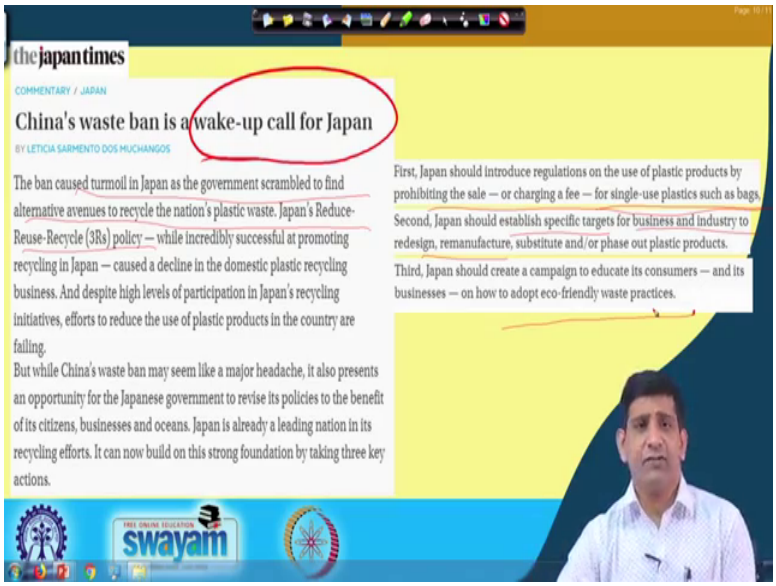

So, now, there has been a lot of impact in terms of in different countries, as you can see that there is a Chinas waste ban is a wake up call for Japan, because Japan was sending a lot of plastics to China. So, they are talking about that China's ban is kind of a wake up call for Japan.

So, it is the Japan cause turmoil in Japan, as the government is scramble to find alternative avenues to recycle plastic waste. So, Japan's reduce reuse recycle policy is possibly like in successful in promoting recycling. Now, they used to collect it, but they send it to China. So, what they should do? There are some suggestion that first Japans had introduced regulation and use of plastic produced by prohibiting the sale are charging a fee of single use plastic.

Japan should establish specific target for business industries to redesign, remanufactured, substitute and the phase out plastic product. Japan should create a campaign to educate its customer and its business. How to adopt ecofriendly waste practices and this is not only true for it is same thing is going to happen in other countries too and it is already happening in other countries, where we need to start looking at that we cannot say this Chinese ban is really a good thing that happened to the world I think in terms of plastic waste management and in general waste management as well, because we are now thinking more in terms of more innovative way of managing

the waste rather than just sending it to China and forget about it and let the Chinese industry deal with it.

So, that is really has created a lot of new ideas, new avenues.

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Thailand is to permanently ban plastic imports by 2021, because the things where a started coming to Thailand. So, they want to now ban plastic imports. So, they do not want plastic in there as well. So, it is a just after Vietnam is stopped issuing license for scrap imports, Malaysia revoked license of 114 of the countries is scrap processor. All of those countries and other in Southeast Asia fear becoming the world's dumping ground for western recyclable materials following China's scrap ban and tightened contaminated to contamination is standards.

So, there all these countries are really worried that we will become a dumping ground including in India. So, we have there are policies are being in place now to. So, that it does not happen.

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Malaysia too and plastic imports within three years, we saw for China similarly, for Malaysia. So, they are looking at imports ban, they also put an import tax on a scrap plastics. Tax approximate after October 23 of 2018 its approximately tax of 23.78 dollars per metric ton will be on plastic imports, where the importing the materials for free now they have to pay. Government is also tightening requirements for Malaysia processors to obtain operating profits.

So, those things are there search for illegal processes. So, news so, those things again there, because of not become a kind of dumping round, because China is not taking this dirty material anymore. So, many countries want to make sure that they do not become a dumping ground over there.

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Vietnam to limit waste exports as shipments build up at ports. So, that is another area where Vietnam is also what it know about.

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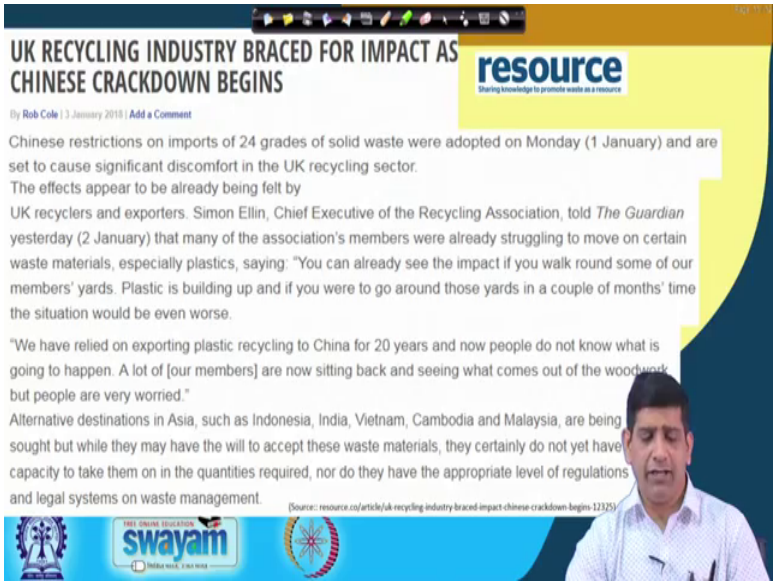

So, see many countries are acting on that UK recycling industry braced for impact as Chinese crackdown begins. So, UK you go to Australia we are was in Australia last summer for four months and most of again working on waste management related stuff and most of the time the focus was more on how to deal with this waste now, including plastic waste since China is now going to take it.

And the thing is that if I have to if there are logic by Australian companies that, if I have to really clean it up to a contamination level of less than 0.5 percent why do not I just use it within my own country? Why should I send it to china then ? So, since I put it so much of energy and if and resources to clean it, I should try to use it within my own countries. So, that is, so that is helping develop new markets for many of these recyclables including for plastic.

So, again the UK is trying to brace for impact as Chinese crackdown. So, UK recyclers are main (Refer Time: 25:09). You will see lots and lots of these news articles and studies coming up. We have put together few just to give you an example, but there will be you will find several of them in and every day every week we see something or the other of these kind of, this is a very very fluid situation right now, in terms of the plastic management.

So, I essentially all these what that does mean? Since China is not going to take those dirty plastic anymore. So, the countries are forced to clean their plastic and many when they are cleaning those plastics they are trying to develop their own market now as well. So, they are trying to develop their own market. So, that they do not have to rely on future market which in the long run is a good thing, which has happened.

So, so, long turn here you can see that there are test there also in UK they are looking at destinations in Indonesia, India, Vietnam, and Canada, Cambodia, Malaysia, but they where, there is no security how long they will also accept this garbage; so those things are there.

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Now, in US scrap exports to China as you can see over here, this is a very interesting, because of this ban now. As you can see initially January to April 2017 the figure of metric tons from 4.41 of like, if you put it in million so 4.1 metric tons and then it gone down to 2.5 or 2.6 million metric ton with a percentage change of minus 37.48 percent, plastic in 92.2 percent even copper, alloys.

So, all these you see that negative here other than the ferrous, other than the ferrous number, which is on the positive here. This is a kind of a odd man, out all these figures are negative; means export has gone down from January, April 2017, same period 2018 what was the difference the Chinese ban came into effect in between here in January 2018, when they started like a forcing the ban.

So, you see there is a so, now what will happen to this difference of the garbage? It has to be managed within US or it needs to find some other market. So, China was taking about 40 percent of the US paper plastic other recyclables, but then dropped by, plastic drop by 92 percent in the first 5 months of the year. Chinese market was greater than 15 markets combined. Now, the US is looking as a backup. So, no other market can possibly take that much volume. So, it is a little time for transition industry still have to react.

So, China's its enormous opportunity that is what I was telling, the China's move to ban recyclable an enormous opportunity US to see value in its own scrap. They said change will not be easy no nor will be quick, but they have many municipalities have invested

heavily in single stream recycling, which everything to put in one recycling box and that it is, that is creating to lot of contamination.

So, single stream recycling again, we can debate, we had, I think that kind of a discussion in the waste management class, integrated waste management class, weather is it a single stream recycling is good, a multi stream recycling is good. Single stream recycling is good as per my operational point of view, but then the quality of the recyclable goes down, because you will have more contamination showing up there.

So, but that is what most of the cities have been practicing in North America. So, let us look at this particular video and then we will stop in terms of where like what the US is struggling with what to do with tons of recycle material. So, we will watch this video and then we will stop this particular module.

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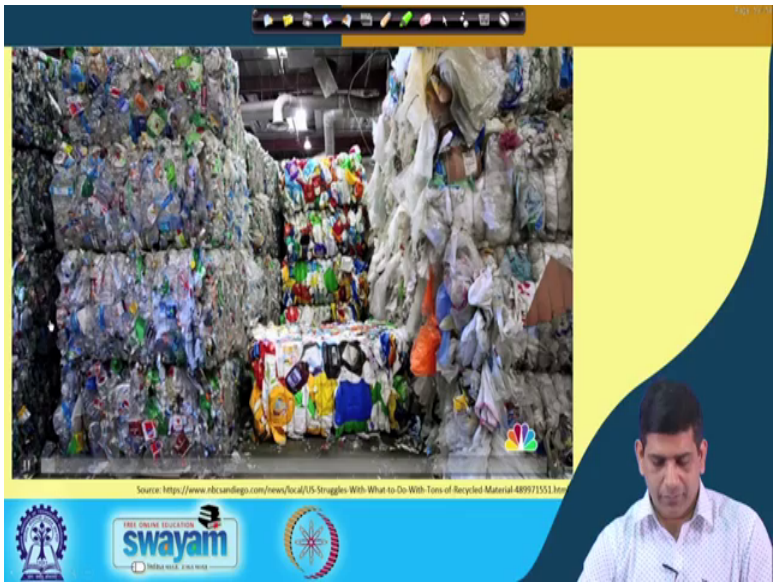

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So, we will discuss it in the will discuss with this starting of the next module, next video of this that would be the last video for this particular week, which will kind of summarize the impact of China ban as you know this particular week the focus has been on the plastic bans in different countries. We talked about India, we talked about some other countries some African countries and then the focus has been of this Chinese ban, because as you must have realized by this time that that is a big deal in terms of plastic waste management throughout the world, including its impact on India.

So, we will continue our discussion in the next video. We will talk about that and then wrap it up wrap up this particular module. So, thank you for, I hope you are taking your quiz on time and if any questions put it on the discussion forum will be happy to answer.

Thanks and see you again.