UNIDAD EDUCATIVA PARTICULAR JAVIER

BACHILLERATO EN CIENCIAS

MONOGRAPHY

"ANALYSIS ABOUT THE MAIN PROBLEMS OF OIL SPILL IN THE AMERICAN COAST

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GRATITUDE

I want to thank my parents for giving me the opportunity to study at a high level school such as the Javier Educational Unit, my teachers for having taught me so much during these 6 long years in my study career, to my pastoralists for helping me and advising me in all the moments in which I need help and especially to help me finally decide my monographic theme, finally my friends for having supported me in all my moments of difficulty and for encouraging me to continue

SUMARY

With this monographic theme I wanted to highlight everything that concerns oil spills, meaning, ways to prevent, solutions thanks to the technological progress of humanity, more important cases in history, etc. Oil spills are undoubtedly one of the most devastating forms of pollution, since they always affect an extremely large area in which both humans, animals and plants can be affected suffering damage to their health and in some cases can reach the death of several species. The human being over the years has been evolving and gaining experience of his mistakes, but sometimes it seems as if he did not learn anything about the oil spills, since despite all the advances that have been achieved even oil spills continue to occur in today's society, of course, ways to solve or clean up the stain have been implemented but they have not managed to avoid spills in their entirety.

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INTRODUCTION

This issue was my choice due to the large number of people who do not know about the oil disasters that have occurred in an ecosystem as beautiful as the ocean and that many scientists have identified the most important that our planet Earth possesses since it covers more than 70 % of this is the home of many species both of plants and animals and even of species that have not yet been discovered due to lack of exploration.

Although many people are unaware of this, it is possible that during the process of cleaning the oil in the ocean this could be more harmed due to the chemicals that are used even using specialized equipment there is a risk that a single error will damage the ecosystem more, which means that a simple oil spill leads to more risks when acting, so it is best to take all kinds of precautions when it comes to handling crude oil.

Throughout history there have been many cases of ships which by some type of shock or fissure have unleashed problems with crude, scientists estimate that every time that occurs in the sea some problem with oil more than 60,000 species of fish are harmed, 20,000 species of birds which in search of food are approaching the oil stain and the only thing they manage to do is to get trapped in the black tides, the ecosystems formed in the oceans also obtain a large destruction reason why it is estimated that 80% of the ecosystems in the area are completely destroyed so the species that inhabit there have to find new places with the same conditions to survive.

Although Ecuador has not presented problems about spills, everything is possible and no one knows when a tragedy can happen, I wanted to focus this study on students with greater maturity,

so I decided to do it for third year students because of the degree of maturity and so that they take part of the world that surrounds us and the problems that undergo the society of today.

In the first chapter I focused on what meant an oil spill for all those people who are not aware of its meaning or what it is based on, this chapter divided it into meaning, causes and consequences taking the most important aspects that I found in my research In the second chapter I wanted to give a focus to all those cases that have occurred in our world, the most famous because of the great disaster they caused and the controversy surrounding the company, even though it affects the environment is irrelevant. In chapter three I focus on the ways to prevent the spill and the ways to clean the areas affected by the spill, with this I wanted to highlight the measures that any authority that manipulates the oil should take for the prevention of disasters since it is true that many companies do not comply with the regime regulations established for the transportation or operation of this

CHAPTER1

What does oil spill mean

1.1. Theory

Man has caused disasters on ecosystems killing large numbers of species, among the most serious disasters that threaten biodiversity is found oil spills in oceans. When there is an oil leak in a body of water, as the sea is called an oil spill, the transportation of crude oil in the marine road may face several problems that end in the oil spill, fortunately oil spills are not common but when the effects occur are very serious. Oil tankers are the main source of these spills, but there are others, such spills can also occur from underwater oil platforms, pipelines or unknown causes.

Oil spills always have devastating effects on the environment, thousands of animals are affected by this problem they could be affected in their health or in their life cycle and even the youngest can be affected during the process of gestation with great possibilities of death because of the crude, Another problem is that despite the great cleaning days that are done to solve this problem the waste of the oil can remain in the marine environment for years and even decades.

Although in our society the frequency of spills has been reduced, it is considered to be one of the main causes of pollution in the world, because it affects not only the marine ecosystem but also everything around it leaving many spots of oil on the beach and many more negative effects for the area around the problem.

The vast majority of people can´t imagine the ease oil has to move through the oceans, reaching to cover hundreds of kilometers in about an hour. On the other hand, about 0.1 to 0.2% of world oil production has been dumped into the sea. The percentage may seem not very large

but it is almost 3 million tons that end up polluting the waters every year, causing damage to the marine ecosystem.

1.2. Causes

Shipbuilding

Scientists estimate that 13% of oil spills to date have been caused by accidents on ships, whether they are fissures, collisions, negligence or disinterestedness of the people in charge of transporting the Kurd.

When these problems occur it is more than unfortunate that negligent companies do not face the consequences of their carelessness, and when they send a representative to talk to the press they do nothing more than give excuses instead of giving their support to the teams in charge of cleaning since they are the ones who are fixing the problem they caused.

Human failure

One of the main failures in the oil plants is the manipulation of the equipment because they are not always properly maintained which causes damages in the systems and can generate leaks in the pipelines that transport the oil, it is estimated that many oil plants have stopped doing proper maintenance due to the budget decrease thinking it´s an easy way to reduce costs but they can´t imagine the problem they are causing to the ecosystem. There have been cases in which there were failures of machinery and nature, we are humans and we make mistakes in these cases reports have been given in which the oil spill has been the mistake of the same corsairs making measurement errors or even calculating the routes becoming inefficient and with a high risk of collision with the seabed.

Perry R. (2010)

"From time to time, things will happen that are divine acts and can ´t be prevented"

Natural Disasters

Even if they were just built, there have been cases in which the same nature interacts in a negative way for itself, being this one that causes the accidents in the ships and even because of great storms, great explosions have occurred in the petroleum plants, although not the most severe cause, a source of direct contamination comes from the land that is thrown to the ground in cities and industrial areas, which are then washed away by river currents to the oceans.

1.3. Consequences

The greatest damage caused is to all the flora and fauna of the area around causing the loss of thousands of species both animal and fish or seabirds and aquatic plants such as plankton would be next to seaweed that despite being abundant in the oceans are generally the most affected by the spill because they are the first to have contact with it and it is almost impossible to prevent because they can´t be moved from the site where they are.

The damage always varies according to several factors, from where the oil spot began to spread, the time of the year, the temperature of the water (if this varies a lot or does not affect also) the climate of the affected area and the marine currents, because in each case it is different the condition due to the factors already mentioned never know what is going to be the total affection of the zone although it is known that the most common are the beaches which are likely

that the crude arrives which would hurt much in health aspect to the human being and the animals that are always the most affected given that there are an estimated fifty thousand of dead species every time an accident of this type occurs.

For marine life there are also factors, one of the most important is the level of exposure that the species have had with the oil, some fish can endure for a long time exposure, however small larvae with minimal contact die instantly causing a great gap in the marine population completely altering the cycle, the birds are the other affected part since they have contact with the oil presents difficulties when flying because their plumage becomes heavier and somehow impossible to take off so they can falling to the ocean and drowning, can also digest the oil because they try to fish their food in order to survive without knowing that the black tide is likely to kill them

CHAPTER 2

Oil spills in history

2.1. History

Over the years oil has been the sustenance of many companies and has helped in the day to day of the human being, however it does not take away the fact that because of this and the bad manipulation at the time of transporting the crude oil misfortunes occur which mark a before and after in the history of humanity and marine life. In history there have been hundreds of cases in which the seabed has been damaged because of the spills, some have even been considered the worst occurred over the years due to the large number of animals that have been harmed Both fish and birds, there are more factors that determine the severity of the spot, for example the size of this is an important factor, obviously the larger the area the greater the number of affected animals and it takes much longer to clean the area.

Even if it is hard to believe many people cannot assimilate that in the marine ecosystem more than ten million tons have been lost since the crude oil began to be transported and that approximately every time this type of misfortune occurs, the animal losses vary between thirty thousand and one hundred thousand counting with both birds and fish.

Scientists estimate that the decade of 1970 was the worst decade in the history of humanity in terms of oil spills due to the incalculable number of tons poured on the oceans

The United States is considered the largest power in the world, however this does not remove the fact that it is one of the powers that has suffered the most from oil spills both in economic terms and in lost species, generally the cases in those that have been involved in the United

States are the most resounding in the world due to the large amount of oil exposed over the sea, it is estimated that in the decade of the 70 United States is the power that has spent most for cleaning stains of oil on the sea with approximately 700,000 tons of oil discarded on the seabed in just one decade

2.2. Old Cases

Ixtoc I

Ixtoc I was an oil exploration well which was located in the Gulf of Mexico to nine hundred sixty five kilometers to the south of Texas and ninety four kilometers of Cuidad del Carmen Ixtoc I was an oil exploration well which was located in the Gulf from Mexico to nine hundred and sixty-five kilos to the south of Texas and to ninety-four kilometers from Cuidad del Carmen, a small accident during the drilling of the crude came to cause the largest non-international spill known to date.

The company PEMEX was the one that was drilling at a depth of 3.22 kilometers an oil well below sea level, a loss of stability caused a large explosion of high pressure which caused a blowout, the oil quickly burst into flames to a spark and the platform collapsed completely. The marine currents brought the oil to the coastal areas of Campache, Tabasco, Veracruz, Tamaulipas and areas of Texas, all of which were exposed to a great degree of contamination, for which the United States demanded a monetary compensation for the damages caused to Mexico. The Mexican company to the American areas, Mexico rejected this demand and forgot the issue but

the oil stain was still there, had to spend two hundred and eighty days for the stain to be completely cleaned. It is estimated that around 3.3 million barrels (approximately 530,000 tons) were spilled into the ocean, of this amount 50% was burned, 16% was evaporated, 5.4% was collected and 28% was dispersed according to the PEMEX Company

Atlantic Empress and the Aegean Captain

In the society of the past it was very rare to hear anything about the spills and certainly the case of the Atlantic Empress and the Aegean Captain was a case that left the world impacted, even though cases of spills were already known, none had been as destructive as the already mentioned, occurred in the Caribbean Sea off the Venezuelan coast, near the Island of Tobago occurred a terrible storm in which they were trapped the tanker Atlantic Empress and the Aegean Captain, in a matter of minutes without anyone noticing both boats collided which produced an explosion and the largest oil spill that was known at that time. Nearly two million barrels (equivalent to two hundred and eighty-seven thousand tons) were thrown sharply into the ocean, this fire did not end only with the life of marine species but also with the lives of the crew of the Atlantic empress, thirty and nine people aboard were only found five while the others were missing, the tanker Atlantic Empress was the one that caused more damage and problems since this fire completely and attempts to put out the fire were in vain, it was necessary to tow the ship out of the area of the spot to a place where it could be undulated so that it would not cause more disasters, it took about two months for the oil to completely disappear from the surface of the ocean.

Oil spill in the Persian Gulf

This spill was produced during the "Gulf War". It took place as a result of the measures adopted by the Iraqi army during the war against the US Army in 1991. This incident caused

damage to the Persian Gulf's fauna, especially in areas around Kuwait and Iraq. It is estimated that the war between Iraq and the United States caused the spill of 462 million gallons of oil

(Approximately 1.5 million tons) the oil spill caused by this confrontation reached a maximum size of 4,242 square kilometers.

2.2.3. Spills nowadays

Although many people do not know, there is a big difference between the spills of today than in those that happened decades ago, it is true that both come to cause colossal problems, but does not take into account the speed with which has advanced the human being in the technological field, more ways have been implemented for the prevention of catastrophes, although you cannot prevent all our progress has given us more security at the time of extracting or transporting the oil, even this advance has facilitated us in cleaning the crude on the marine surface.

Deepwater Horizon

On April 20, 2010 an explosion occurred in the Deepwater Horizon oil field in which eleven workers lost their lives due to the explosion, after which the platform in flames was sinking little by little and spilling around 900 million liters of oil on the surface, the spot took a catastrophic size because it equaled the size of the state of Connecticut and added 7 million liters of toxic dispersant which was intended to hide the surface spot, this only brought more damage and that caused the formation of drops of oil that slowly sank in the depths, the United States and Mexico united to fight this spill since it was the minimum that they could do because the oil plant belonged to both powers, even though many solutions were given to combat the stain unfortunately most of these were completely useless because the fissure was in the depths since the plant had sunk completely after two days, the common cleaning methods had to be replaced

with the use of a submersible robot, this had to descend more than 1500 meters to seal the fissure and thus start the process cleaning.

Coast of Louisiana, in the Gulf of Mexico

This spill was reported by the US Coast Guard, it would give notice about 400,000 gallons of oil spilled in the Gulf of Mexico, apparently it was reported that the cause was a rupture of the underwater pipeline.

Luckily the flow of oil from the pipeline was quickly controlled and did not give much problem, it is estimated that about 9,000 barrels of oil were spilled over the Gulf, the coast guard responsible for the area said that the spill lasted approximately two and a half days, I do not represent great danger for the coastal zones since the petroleum that was in the surface moved quickly with an opposite direction to the open sea.

This was not the first spill presented in the Gulf of Mexico, since in 2010 after an explosion on the Deepwater Horizon platform suffered a major spill to the Louisiana Coast, this ended with the lives of 11 workers of the platform and caused a spill of 4 million barrels of crude oil

CHAPTER 3

HOW TO PREVENT IT AND WAYS TO CLEAN THE AREA

3.1. Most well-known methods

Over the years the human being has been able to learn from the mistakes he has made about the oil spills, with this he has been able to create prevention measures for future disasters, which undoubtedly have been of great help for the control. The most well-known and eficases methods are undoubtedly the following

- The barrier
- The absorbers
- Dispersing agents
- Burning in situ the spilled product

3.2. Rules on ships

Part of the plan for the prevention of oil spills is the development of strict guidelines for the ships that transport it, they must comply with the rules and if they violate there are fines and taxes. If a company is found responsible for an oil spill, they must pay the full cost of the cleanup.

Good equipment maintenance is essential for the prevention of oil pollution. When it comes to oil spills it is not a question of whether or not it will happen, but rather a question of when it will happen. There are more than 200,000 million tons of oil that are transported annually in the oceans around the world. The care, inspection of equipment and the adoption of measures to prevent such accidents is an important part to prevent these huge problems from occurring.

Many of the ships under construction today for the transportation of oil have safety regulators, and have been designed to reduce the amount of oil that could possibly be spread out in case of an accident. This means that even if an accident occurs and the oil spills, it will not be thousands of gallons.

All operators of oil tankers must be well prepared to know how to respond in case of problems, including an oil leak. There are action plans that include coming to the aid of other boats also when such help is needed.

Good training is essential to make everything happen. Safety drills should be done at regular intervals, as an act of prevention of oil pollution. All employees must have in-depth training and be able to demonstrate their ability to help in times of crisis.

3.3. Barrier

The barrier is a floating physical obstacle used to control the movement of oil. Usually, the barrier is the first mechanical response that is transported to the site of a spill. It is used for 1) the stopping of the oil layers in order to collect them by means of skimmers or through in situ burning of the product, 2) diverting or guiding the oil layers to a storage area or moving them away of susceptible resources, 3) exclude the oil layers of the selected areas and protect the marine coasts and recreation sites, and 4) to collect the oil after the application of absorbents.

The barriers are manufactured in a wide variety of models, sizes and materials for different circumstances of use.

Protection of the marine coasts

It aims to reduce:

• The environmental impacts

• The duration of response operations

• The generation of waste

If the attempts fail, methods must be used to divert the layers to less susceptible areas. This section discusses several ways to keep oil away from susceptible areas and marine protection measures are identified.

3.4. Absorbents

Absorbents are used to collect small amounts of oil by means of the absorption which is the penetration of the oil into the absorbent material, and / or of the adsorption which is the adhesion of the oil to the surface of the absorbent material. To improve collection, most absorbers are both oleophiles (which attract oil) and hydrophobic (which repel water).

The use of absorbent materials in large spills is generally limited by five main factors:

• The logistics of the application and collection of absorbents in very extensive oil layers

• The particularly laborious nature of the operation

• Relatively high costs (compared to the use of small skimmers)

• Relatively low recovery rates

• The large amount of solid waste generated

In general, the use of absorbents is only appropriate during the final stages of a cleaning operation or to assist in the collection of very thin oil layers. Absorbents can also be used for secondary spills, as well as to protect or clean susceptible areas such as turtle nesting sites or swamps, where the use of other cleaning methods is restricted due to the damage they may cause.

3.5. Dispersing agents

Below are the basic aspects of the use of dispersing agents:

The use of dispersing agents should be considered in conjunction with other potential methods and spill response equipment, and not as a last resort. To obtain maximum effect, dispersing agents should be applied as soon as possible after a spill. During the first stages of a spill, oil has not degraded and has not spread too much, which facilitates dispersion.

The decision on the use or not of dispersing agents should be made after considering the potential effects of dispersed oil against the potential effects of the not dispersed oil layers. The objective should be to reduce the ecological impact to the general level, thus maximizing the net environmental benefit.

It is recommended that the Emergency Response Manager consult with technical advisors and regulatory bodies, who can provide opinions regarding ecological interests and the advantages and disadvantages of using dispersing agents in the area in question.

The use of dispersing agents requires logistics planning that includes aircraft and / or vessels, equipment, supply of dispersing agents and fuel, an adequate number of personnel, personal protection equipment and the calibration of equipment.

3.6. Burning in situ the spilled product

There are several situations in which controlled in situ burning of spilled oil can be done safely and efficiently. In the United States, the use of in situ burning of spilled product has previously been approved in many coastal areas as a response option to spills under certain conditions. The burning in situ of the spilled oil does not replace the application of the dispersing agents or the containment and mechanical collection of the spilled product. However, there are

often situations where incineration may be the only means to remove large quantities of oil safely and quickly.

The objective is to select the optimum equipment and application techniques that result in the least possible impact on the environment in general.

3.7. Skimmers

Skimmers (skimmers / vacuum cleaners / surface cleaners) are mechanical devices that physically remove the free oil or content on the surface of the water. There are numerous classes of "skimmers" but all can be classified into four categories based on the principle used for the recovery of oil. Manufacturers often offer different sizes or models of the same basic type of "skimmer" and in many cases you can find old models updated with new versions. For a certain type of "skimmer", different manufacturers produce similar devices, each with its own design.

CHAPTER 4

POLL

Objective: Investigate the factors that affect the habitats of animals in the American Coast

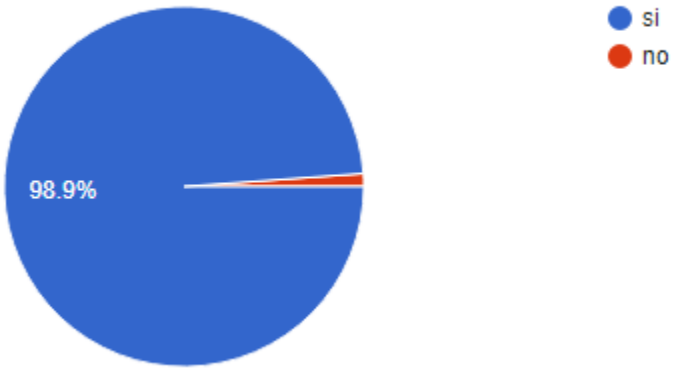
Objective group: Students and young adults

Choose an answer according to your

1. - **Do you think that problems of pollution in oceans has worsened over the years?**

a) Yes

b) No

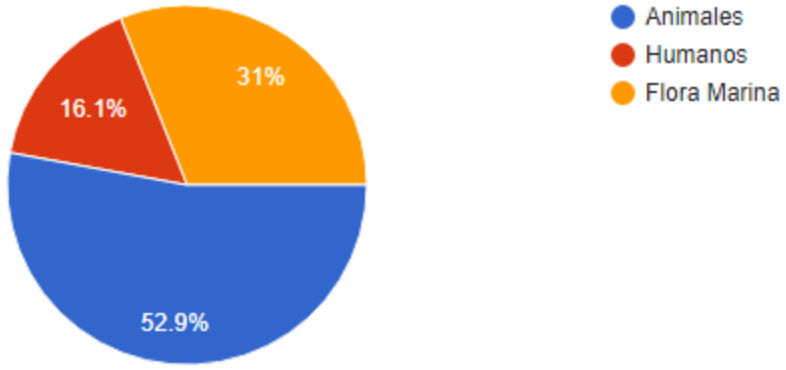


2. - Who do you think are the most affected by this problem?

a) Animals

b) Humans

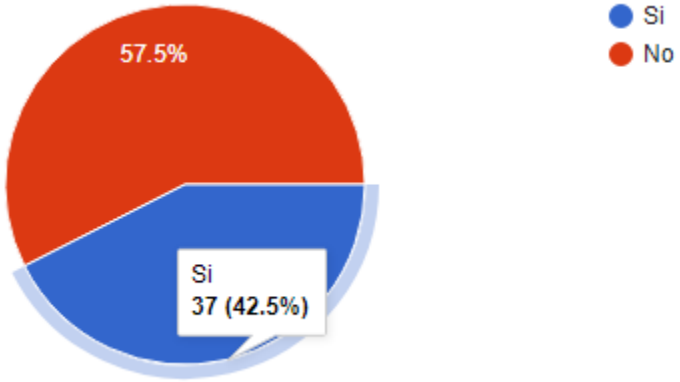
c) Plants



3. - **Do you think the oil spill is worse than the loss of species?**

a) Yes

b) No

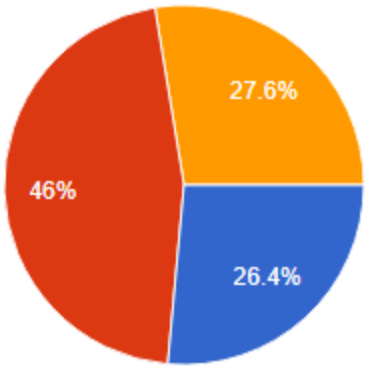


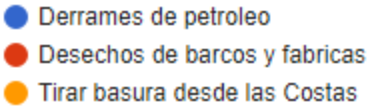
4. - **What do you think is the most common form of pollution in the oceans?**

a) Oil spills

b) Ship waste

c) Throw garbage

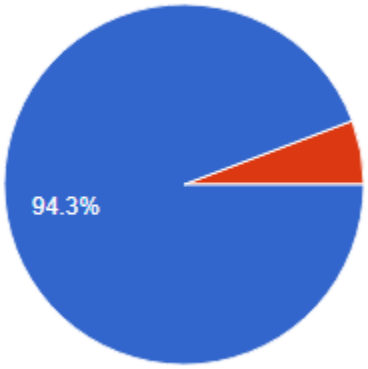




5. - **Do you consider there should be a major sanction against ship-owners that cause the oil spill?**

a) Yes

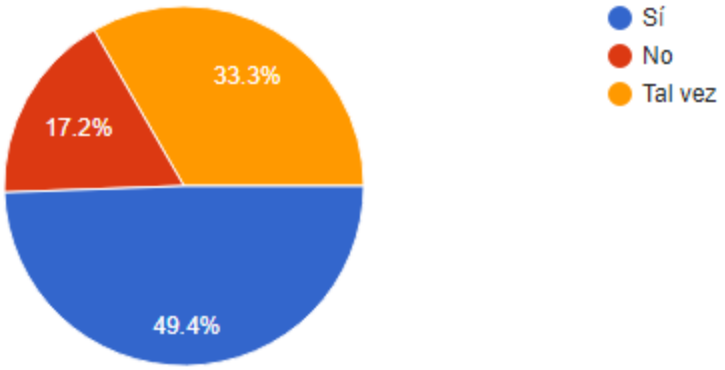
b) No



6. - **Do you think oil spill damage is irreparable?**

a) Yes

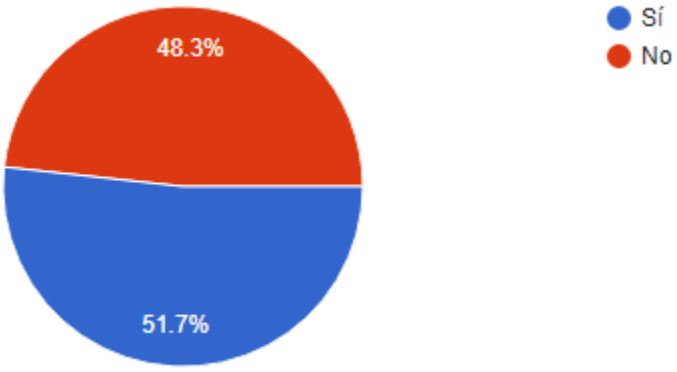
b) No



7. - **Do you know about any species that has reached the edge of extinction because of pollution?**

a) Yes which one.....?

b) No

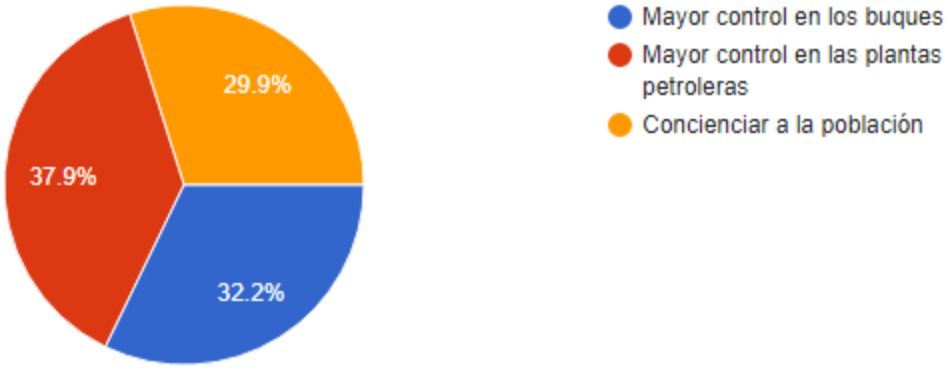


8. - **How are these types of problems usually prevented?**

a) Higher control on ships

b) Make people aware

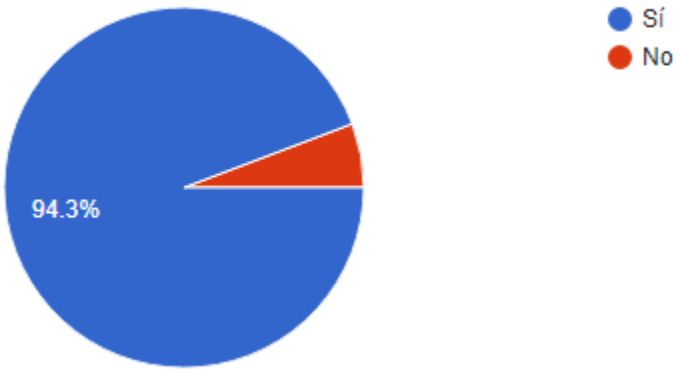
c) Higher control in oil plants



9. - **Do you consider that people should make better decisions?**

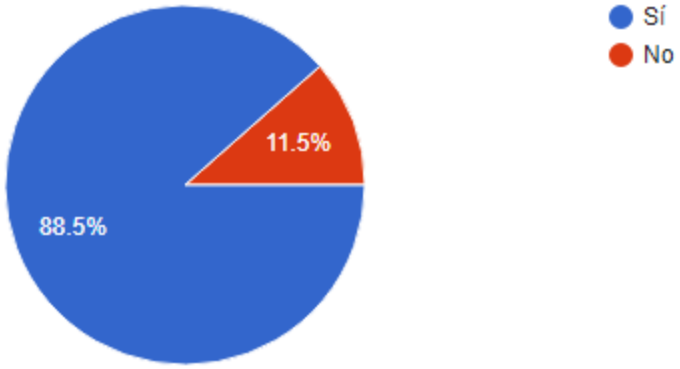
a) Yes

b) No



10. - Would you participate in some campaign for the prevention of these disasters?
a) Yes

b) No


Sí
No
11.5%
88.5%

CONCLUSIONS

Oil spills are facts which have been increasing in number over the years and our duty as inhabitants of planet earth is to take all necessary measures to prevent any disaster related to oil

All the cases presented in the text are just one of the few that have occurred in the last decades. With this I want to show the fact that each year there is a new case or more of oil spills and to publicize the damage that can cause each one.

Thanks to the technological advances that man has made, we have discovered new ways to prevent these disasters as new ways to control the oil slick on the surface of the water, this has helped a lot for the survival of the species that have been affected by the oil

RECOMENDATIONS

At the end of this work it is recommended that:

For a world power such as the United States, should take this issue more deeply, many companies which are responsible for transporting oil do not take the necessary measures and this is where the US government should intervene to apply severe sanctions.

With the history of events that have occurred around the American coasts, the United States with this should learn from the mistakes of the past for the prevention of future spills.

These technological advances should be shared to the world since not all the powers have a way to prevent or clean an oil stain, these inventions should be used even by small countries because even they could have some catastrophe at any time

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