



STUDY ON

THE IMPACT OF MICROPLASTICS
POLLUTION IN MEXICAN

FISH

EXECUTIVE

SUMMARY

GREENPEACE



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Thirteen million metric tons of plastic are thrown into our oceans each year. This plastic pollution causes environmental and economic damage that transcends borders and affects more than 700 marine species. In Mexico we produce more than seven million metric tons of plastic per year; 48% of this plastic is used for containers and packaging that are not recycled since our recycling capacity of valuable residues is only 6.07%.

Most of the plastic that pollutes our oceans has a very small diameter (less than 5 millimeters); these are known as **“microplastics”**. Given their low weight, microplastics can easily be transported by oceanic currents, which has allowed them to reach coasts all over the planet, the poles, and even the deep sea. Due to their small size, sea animals can have difficulty distinguishing microplastics from their natural prey.

Fish are the group most commonly reported with microplastic presence in their stomachs, so we decided to investigate how this contamination reaches fish sold at local markets.

The presence of plastic in fish could potentially affect consumers' interest in these products and, consequently, the economics of local fishing communities.

The document **STUDY ON THE IMPACT OF MICROPLASTICS POLLUTION IN MEXICAN FISH** shows the results of civil society organizations and Mexican scientists' unified efforts to demonstrate how plastic pollution is affecting our oceans, biodiversity, food, and economy. This report exhibits the effect of microplastics in three Mexican ecoregions: **The Gulf of California (La Paz, B.C.S.), the Gulf of Mexico (Veracruz, Ver.) and the Mexican Caribbean (Puerto Morelos, Q. Roo)**. In order to do this, we worked alongside fishermen's cooperatives and visually examined the stomach contents of different commercially important fish species in each region to search for plastic fragments.

Likewise, we analyzed at Greenpeace Science Unit a subsample (144) of the fragments found so we could confirm whether or not the fragments were actually plastic.

Among our main results, we found that:

- Twenty percent of the 755 fish sampled contained plastic fragments. This was validated after calculations in laboratory analysis using the Fourier Transformed Infrared Spectrometry (FT-IR) technique. We calculate that approximately 1006 fragments are real plastic.
- Most of fragments (49%) were identified as modified cellulose that could still come from some manufactured fibers such as cotton from clothing, however this needs further research.
- Although most of the fish had only one plastic fragment in their stomachs, we found 45 fragments in one fish.
- Laboratory analysis identified eight different kinds of polymers from the fish stomachs: cellophane, ethylene-vinyl acetate (EVA), nylon, polyacrylate, polystyrene, polyester, polyethylene, and polypropylene.
- Fibers were the type of plastic most commonly found (98%), and the majority of microplastics were either blue (45%) or black (41%).

Cellophane was the dominant type of polymer found. This polymer is used to wrap gifts and food as well as in auto adhesive tapes.

The other polymers found have various uses including as fibers for clothing and textiles (nylon, polyacrylate, and polyester), rigid plastic for containers (polystyrene and polypropylene), fishing equipment and vessel materials (polyacrylate and polypropylene), electric instruments production (polyester), or bottles, supermarket bags, small single-use packaging, and other containers for industrial use (polyethylene).

We found clear differences between the regions studied in the percentage of fish with microplastic presence as well as in the total number of microplastics and the number of plastics found per organism.

The most affected region was Veracruz, with an average number of plastics per organism two times higher than the other two regions. This could be related to the increased urban impact this site suffers, which results in a greater amount of suspended solid waste from runoff or wastewater discharge. Fish from La Paz showed the least impact from microplastic pollution, which could be due to the region's low population density compared to the other regions and therefore to its lower waste and discharge generation.

Our findings of microplastic in the fish stomachs do not provide direct evidence of human exposure to this pollution because the stomach is not usually consumed; however, these plastics could act as vehicles to carry different chemicals into the marine environment. Chemicals such as styrene, toxic metals, phthalates, bisphenol A (BPA), polychlorinated biphenyls (PCB), and polycyclic aromatic hydrocarbons (HPA) can be intentionally added during plastic manufacturing or absorbed by the plastic's surface during its use and permanence in the environment. There is a potential risk of transfer of pollutants ingested

by fish to the parts commonly consumed (i.e., the meat), as well as possible toxic effects that could diminish the quality of the fish meat. These risks are especially alarming for human communities where fish is an important component of their diet and fishing activity is a crucial part of their economy.

The fish sampled in our study are mostly fished for local consumption and are not exported for sale. Nonetheless, some of these species are part of commercially important fisheries and are included in the **Carta Nacional Pesquera (National Fishing Charter)**. Furthermore, some of the exported species are among the species most affected by plastic pollution. Examples include grey snapper (*Lutjanus griseus*), white mullet (*Mugil curema*), and king mackerel (*Scomberomorus cavalla*) in Veracruz and red grouper (*Ephinephelus morio*) in Puerto Morelos.

Fishing is a very important economic activity in our country, and microplastic pollution has both economic implications and an important social component that our government should consider.

Although different states and cities have taken steps to restrict or forbid the use of single-use plastic items, our legislators must stop plastic pollution from its origin through changes in the **Ley General para la Prevención y Gestión Integral de los Residuos (General Law for the Prevention and Integral Management of Waste)**. These changes should take into account:

1. The responsibility of the producer.
2. Single-use plastics elimination through the ban on products and materials that cause negative impacts on the environment.
3. Labeling that informs consumers about the negative environmental impacts of the products and the proper way to dispose them.
4. Prohibition of incinerating containers and packaging that can be recycled.

Additionally, there is another type of microplastic that deserves the same or even more attention as fibers, even though they are not as abundant: plastic microbeads. These plastics are increasingly manufactured in order to replace natural exfoliating materials such as pumice stone, oat, and nutshells, or for use in cosmetics like cleansers, toothpaste, and abrasive exfoliants. Unlike with plastic bags, there have been limited interventions to reduce microbeads even though public support to ban them is growing and it has inspired **multinational enterprises, NGOs, and politicians to take action**.

In Mexico, a prohibition on microbeads could be possible through a modification of article 269 of the Ley General de Salud

(General Health Act) to ban the sale, manufacture, and distribution of cosmetic products that contain microplastics, defined as any plastic 5mm in diameter or smaller.

Microplastic marine pollution is a problem not only in Mexico but in many other parts of the world.

Microplastic marine pollution is a problem not only in Mexico but in many other parts of the world. Citizens need to realize that we can help reduce the amount of plastic that ends up on our beaches and in our seas with actions as simple as putting garbage in the trash can or participating in beach cleaning programs. **But this is not enough.**

Collaboration between different government agencies and with non-governmental agencies is necessary to establish intervention and research programs directed to prevent microplastic pollution and to clean the oceans.



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OUR CONCLUSIONS

- Approximately **20%** of the fish sampled in our study had plastic in their stomachs.
- Differences in the percent of fish with microplastics, as well as in the number and type of microplastics found, varied between regions, which seems to be related to urbanization in the study sites: **the greater the urban impact, the more presence of microplastics in fish.**
- Cellophane was the predominant polymer found. It is used as wrapping for gifts and food as well as in auto adhesive tapes. The other polymers found have various uses including fibers for clothing and textiles, containers, and bottles, supermarket bags, and small single-use packaging.
- Commercially important fish such as white mullet, king mackerel, snapper, and grouper

had microplastics in their stomachs, **which indicates that fishing activity could be affected by microplastic pollution.**

- The current Mexican regulations must be modified in order to restrict plastic items and stop this pollution from its source. **We propose changes to the Ley General para la Prevención y Gestión Integral de los Residuos (General Law for the Prevention and Integral Management of Waste)** that include increasing the producers' responsibility and eliminating single-use plastic items, among other things.
- **We also propose to modify article 269 of the Ley General de Salud (General Health Act)** to forbid the sale of microbeads, another type of microplastic that is very abundant.

We are certain that legislative measures like those proposed here, along with environmental education and proper management of solid urban waste, will positively contribute to decreasing plastic pollution that affects our oceans and our economic activities, and, eventually, it would help lower the impact of our consumer consumption on biodiversity the world over.

From Greenpeace and the Center for Biological Diversity, we call to action those companies that pollute our oceans the most to assume responsibility and commit to change their packaging practices that currently use an excessive amount of plastic. By doing so, we can significantly reduce this material from its source.



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