

# GAME OF WASTE

GREENPEACE



**IRREVERSIBLE  
IMPACT**

**GAME OF WASTE, 2022**

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# **GAME OF WASTE**

**IRREVERSIBLE IMPACT**

**GREENPEACE**

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# 1. GAME OF WASTE

Many countries claim that they destroy, incinerate or recycle the plastic waste that they collect.<sup>1</sup> On the surface, European countries appear to have excellent waste management: look no further than the litter-free city streets and pristine natural beauty spots. However, behind this beautiful picture there are hidden mechanisms at play.

High-income countries transport millions of tonnes of plastic waste they produce to low- or middle-income countries to be recycled. In other words, if you purchased a product from a store in Berlin<sup>2</sup> or London<sup>3</sup>, the packaging of that product will be disposed of not in these cities, but possibly by incineration or random dumping in countries like Malaysia, Vietnam, and Turkey.<sup>4</sup>

High-income countries lost the biggest backyard for their plastic when China banned waste importation, including many plastic materials, back in January 2018. Many countries had been exporting their plastic waste to China for the previous 25 years due to the country's low processing costs. When the ban came into effect, the countries responsible for the majority of plastic waste in the world found new trade routes by which to dispose of their waste. However, the plastic waste load of developed countries, which has become so high that it is impossible to control or recycle, is now being transported to countries that lack the infrastructure to manage even their own waste, let alone the waste of other countries.<sup>5</sup>

As Malaysia, Vietnam, and Thailand followed China's footsteps and put restrictions on plastic waste importation, Turkey has become the new plastic waste destination of Europe.

**According to Eurostat, the amount of plastic waste sent from Europe to Turkey has increased 196-fold since 2004.<sup>6</sup> Turkey imported 656,960 tonnes of plastic from Europe in 2020.<sup>7</sup> Of this amount, 209,642 tonnes came from the UK alone, a 36% increase from the previous year. Germany was the third biggest exporter with 136,083 tonnes, which was an increase of 102% from the previous year.**

<sup>1</sup> Greenpeace Malaysia. The Recycling Myth, 2018.

<sup>2</sup> Greenpeace Deutschland. Factsheet: Plastic Waste Exports to Turkey. 2021.

<sup>3</sup> Sandra Laville, "UK plastics sent for recycling in Turkey dumped and burned, Greenpeace finds" The Guardian, May 2021.

<sup>4</sup> Greenpeace UK, Trashed. 2021.

<sup>5</sup> Cole, Laura, Katie Burton, Katie Burton, Sian Sutherland, Thomas Bird, Jon Wright, and Images Bradley Secker Words Katie Burton et al. 2021. "China'S Plastic Import Ban In Numbers - Geographical Magazine". Geographical.co.uk.

<sup>6</sup> Eurostat, 2020.

<sup>7</sup> Eurostat and UK Trade Info, 2020.

## CONFRONTATION TIME

As plastic waste importation has increased at an uncontrolled rate in Turkey, there has also been a surge in illegal disposal methods. The dumping and burning of plastic garbage has been reported in İzmir and İstanbul<sup>8</sup> - but this activity is centred in Adana. The scale of plastic waste importation to Turkey was first brought to the attention of the public in 2018 with a news report in The Guardian, which investigated the fate of the plastic waste exported by the United Kingdom to the country. The story was then reported further by many other international media outlets.<sup>9</sup> During the same period, Greenpeace Mediterranean revealed that tonnes of mixed plastic garbage imported from Italy were being illegally stored in the backyard of a house in the Kemalpaşa neighborhood of İzmir.<sup>10</sup> This incident demonstrated that some of the plastic waste imported by Turkey was being illegally disposed of. The BBC broadcast footage from Adana, which showed that some plastic waste brought from the UK was clearly not recycled and instead processed illegally.<sup>11</sup> Investigations conducted by Greenpeace UK and Germany following these news reports also showed how the waste of these countries mixed into the soil and water of Adana and visibly polluted the air by being burned.<sup>12</sup>

## HUNDREDS OF THOUSANDS OF SIGNATURES AND MANY DECISIONS

The images of illegally processed plastic waste revealed by Greenpeace in 2020 caused a stir in Turkey. The “Do Not Let Turkey Become a Dump”<sup>13</sup> campaign garnered hundreds of thousands of supporters, prompting action from decision-makers.

Since the Greenpeace plastic waste campaign started in late 2019, many new regulations have been issued in the Official Gazette (Turkey’s official journal, which publishes new legislation and governmental announcements).

<sup>8</sup> Alibeykoy-Baraji-Cevresinde-Korkutan-Goruntu-Buyuk-Tehlike-Uzmanlar-Uyardi. (2021). Hürriyet.

<sup>9</sup> “Turkey’s Plastic Waste Imports From The UK Are Booming – But At What Cost?” 2021. The Guardian.

<sup>10</sup> “Greenpeace Mediterranean, Greenpeace’ten İzmir’deki Plastik Atık Hakkında Suç Duyurusu, 2021.

<sup>11</sup> “Turkey’s Plastics Ban: Where Does The UK Send Its Waste Now?” 2021. BBC News.

<sup>12</sup> “Greenpeace International “Investigation Finds Plastic From The UK And Germany Illegally Dumped In Turkey, 2021.

<sup>13</sup> Greenpeace Mediterranean “Türkiye Çöplük Olmasın!” 2021.







# PLASTIC WASTE IMPORTS TO TURKEY: A TIMELINE

SEPTEMBER 2019

AFTER COUNTRIES LIKE CHINA, VIETNAM, MALAYSIA, AND THAILAND RESTRICT PLASTIC WASTE IMPORTS, EUROPEAN COUNTRIES DIVERT MORE WASTE TO TURKEY.

GREENPEACE MEDITERRANEAN RESEARCH REVEALED THE ILLEGAL STORAGE OF GARBAGE BROUGHT FROM ITALY IN THE CITY OF İZMİR.

DECEMBER 2019

WHILE THE WASTE IMPORT QUOTA OF TURKISH PLASTIC WASTE IMPORT COMPANIES WAS **80%** OF THEIR WHOLE CAPACITY, THIS RATE WAS REDUCED TO **50%** BY MINISTRY OF ENVIRONMENT, URBAN PLANNING AND CLIMATE CHANGE.



MAY 2020



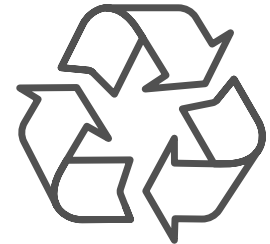
TURKEY BECAME THE LEADING BUYER OF EUROPE'S PLASTIC WASTE IN 2019:

**IMPORTATION HAS INCREASED 173 TIMES IN THE LAST 15 YEARS.<sup>14</sup>**

JUNE 2020

BBC NEWS:

**“IS THIS RECYCLING?”<sup>15</sup>** NEWS REPORT REVEALED THAT WASTE EXPORTS TO TURKEY ARE NOT ALWAYS BEING RECYCLED.



<sup>14</sup> Greenpeace Mediterranean, Türkiye’de Plastik Atık İthalatı Son 15 Yılda 173 Kat Arttı, 2021.

<sup>15</sup> [https://www.youtube.com/watch?v=hw6KR2vj\\_bc](https://www.youtube.com/watch?v=hw6KR2vj_bc)

<sup>16</sup> Greenpeace Deutschland. Europäisches Plastik in der Türkei. 2020

<sup>17</sup> Republic of Turkey Official Gazette Notice on the amendment of Import Inspection of Wastes Controlled for Environmental Protection (Product Safety and Inspection: 2021/3) Statement. 25.3.2021.No: 31485

According to the reported data by BAN<sup>22</sup>, regulations mentioned in the timeline greatly reduced imports. However, there has been no attempt to mitigate the damage already done to the environment through the illegal dumping of plastic waste.

OCTOBER 2020

GREENPEACE GERMANY FIELD INVESTIGATION REVEALED UNPROPER WASTE IMPORTATION.<sup>16</sup>



JANUARY 2021

MIXED PLASTIC IS BANNED.<sup>17</sup>

TURKEY PROVIDE NO REPORTING FOR BASEL CONVENTION'S PLASTIC WASTE AMENDMENTS.

APRIL 2021

TURKEY IS AGAIN THE LEADING BUYER OF EUROPE'S PLASTIC WASTE IN 2020:

**THERE HAS BEEN A 241-FOLD INCREASE IN THE LAST 16 YEARS.<sup>18</sup>**



MAY 2021

GREENPEACE UK LAUNCHES ITS TRASHED REPORT.<sup>19</sup>

THE RESULTS OF GREENPEACE UK AND GERMANY'S INVESTIGATIONS ARE REVEALED.

TURKEY ISSUES AN IMPORTATION BAN ON ETHYLENE POLYMER PLASTICS.<sup>20</sup>

JULY 2021



**POLYETHYLENE BAN IS PULLED BACK BY THE MINISTRY OF COMMERCE,**

HOWEVER, THE MINISTRY OF ENVIRONMENT, URBAN PLANNING AND CLIMATE CHANGE MAINTAINS THE 1% CONTAMINATION LEVEL IN ITS IMPORTATION CRITERIA.<sup>21</sup>

<sup>16</sup> Eurostat data, 2020.

<sup>19</sup> Greenpeace UK. Trashed. 2021.

<sup>20</sup> Republic of Turkey Official Gazette Notice on Import Inspection of Wastes Controlled for Environmental Protection (Product Safety and Inspection: 2021/5) Statement. 18.5.2021. No: 31485

<sup>21</sup> Republic of Turkey Ministry of Environment And Urban Planning, Directorate General of Environmental Impact Assessment, Permit and Inspection 16.7.2021. Belge No: 2021/16

<sup>22</sup> <https://www.ban.org/plastic-waste-project-hub/trade-data/turkey-import-data>





Earth will remember

## IRREVERSIBLE IMPACT

Not all plastics can be recycled.<sup>23</sup> Moreover, if plastic is disposed of in an illegal way, it can cause irreversible damage to both nature and human health. If contaminated plastics with unknown content are dumped into the environment, or burned in the open air, they can pollute the soil, water, and air with hazardous chemicals. This is a particular risk if these chemicals enter into the food chain.

<sup>23</sup> UNEP (2018). SINGLE-USE PLASTICS: A Roadmap for Sustainability (Rev. ed., pp. vi; 6).

# THREE WITNESSES: SOIL, AIR, AND WATER

To examine the impact of the dumping and open burning of waste plastics with unknown content on human and environmental health, samples were collected from soil, ash, water, and sediment, together with samples of plastic waste, from five different dumping sites in the Adana province. These samples were examined by Greenpeace Research Laboratories and by an independent laboratory. The sampling was conducted on 15-16 April 2021 following data reported by a Greenpeace Mediterranean and Germany investigation in October 2020 and by Greenpeace Mediterranean, the UK, and Germany in their April 2021 investigation. The sampling was carried out in illegal dumpsites of suspected imported plastic waste, previously documented by the Microplastic Research Group. The samples collected from the dumpsites were examined for chemical pollutants associated with the plastics themselves, or from the open burning of plastics. This included analyzing the concentrations of 16 different polycyclic aromatic hydrocarbons (PAHs), some of which are carcinogenic; 18 different polychlorinated biphenyls (PCBs), including those exhibiting dioxin-like toxicity; 17 different polychlorinated dibenzo-dioxins/furans (PCDD/F) commonly known as dioxins/furans; and 18 different heavy metals and metalloids. These were compared with samples collected from nearby control locations not directly affected by activities at the dumpsites.

**PAHs** are toxic compounds, some of which are carcinogenic. They are produced as a result of the partial combustion of organic compounds. PAHs can enter the human body through air, water and food. Some can cause mutations in the DNA. Over 100 PAH compounds have been identified in the environment. However, 16 PAH compounds – which are thought to be the more carcinogenic and toxic – are considered among priority pollutants.<sup>24</sup>

**Polychlorinated Biphenyls (PCBs):** PCB is a common name for over 200 chemicals that are structurally similar but manufactured in different configurations, with a wide range of uses. PCBs are frequently used in sectors such as the polymer, electrical, and paint industries. They can also be generated during the combustion of chlorinated materials, including chlorinated plastics. Although their manufacturing has been banned for a long time, chemicals in this group are still found in biological systems. Chronic exposure can cause teratogenic effects, leading to mental retardation and skin lesions<sup>25</sup>. There is also strong evidence of postnatal transfer of PCBs from exposed mothers to their babies via breast-feeding.<sup>26</sup> There is also strong evidence of the adverse effects of PCBs on hormone systems.<sup>27</sup>

<sup>24</sup> Alver, E., Demirci, A., & Özcimder, M. (2012). Polisiklik Aromatik Hidrokarbonlar ve Sağlığa Etkileri . Mehmet Akif Ersoy Üniversitesi Fen Bilimleri Enstitüsü Dergisi , 3 (1) , 45-52 . Retrieved from <https://dergipark.org.tr/en/pub/makufebed/issue/19422/206555>

<sup>25</sup> Fernie, K., Bortolotti, G., & Smits, J. (2003). Reproductive abnormalities, teratogenicity, and developmental problems in American kestrels (*Falco sparverius*) exposed to polychlorinated biphenyls. *Journal of Toxicology and Environmental Health, Part A*, 66(22), 2089-2103.

<sup>26</sup> Yakushiji, T., Watanabe, I., Kuwabara, K., Tanaka, R., Kashimoto, T., Kunita, N., & Hara, I. (1984). Postnatal transfer of PCBs from exposed mothers to their babies: influence of breast-feeding. *Archives of Environmental Health: An International Journal*, 39(5), 368-375.

<sup>27</sup> Hallgren, S., Sinjari, T., Håkansson, H., & Darnerud, P. (2001). Effects of polybrominated diphenyl ethers (PBDEs) and polychlorinated biphenyls (PCBs) on thyroid hormone and vitamin A levels in rats and mice. *Archives of toxicology*, 75(4), 200-208.

**Dioxins and Furans (PCDD/F):** This is the general name of a very large group of toxic chemicals. These compounds are by-products of the combustion of chlorinated materials, including some plastic wastes. They predominantly enter the body via ingestion.

However, exposure via respiration and potable water are also possible. As incineration is a widely used method for waste disposal, public health is potentially threatened by dioxins and furans where chlorinated materials are involved. In addition to skin lesions and the suppression of hormonal and immune systems, dioxins and furans are known to be fetotoxic and to trigger tumor formation.<sup>28</sup>

**Metals and Metalloids:** P Open burning of waste, including plastics, can lead to the release of various

metals and metalloids, including but not limited to cadmium, chromium, manganese, antimony, arsenic and lead. Cadmium and lead are toxic materials that can persist after being released into the environment. They accumulate in the body in the case of repeated exposure. Lead can cause irreversible damage to the nervous system, and can impair its development in children. It may also affect the circulatory system, kidneys, and reproductive organs. Cadmium is classified as carcinogenic for humans. Extended cadmium exposure can cause damage to the kidneys and bones. High levels of copper and zinc exposure can cause potential toxic effects, including gastrointestinal disorders. Even the lowest amount of copper contamination in water can be toxic for aquatic organisms.

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<sup>28</sup> Stander L, Theodore L. Environmental regulatory calculations handbook. New Jersey: John Wiley & Sons, 2008: 321-3.



## 2. MAIN FINDINGS<sup>29</sup>

- In this study, **the presence of hazardous chemicals was investigated**, including toxic chemicals that are persistent, only breaking down very slowly in the environment. These chemicals can build up in the body and cause diseases in exposed people.
- **The examinations were conducted on soil, ash, water, and sediment samples collected from five different locations in Adana province.** At these sites, plastic waste imported mainly from European Union<sup>30</sup> states and the UK<sup>31</sup> is illegally dumped and burned in the open.
- The presence of a wide range of **toxic chemicals**, many of which are known to be **produced during the process of burning plastics, was identified in ash and soil samples from all five locations.**
- The plastic waste samples collected from dumping and open burning sites located in **Çukurova/Karahan, Seyhan/Kuyumcular, and Yüreğir/İncirlik** were found to contain **various toxic organic chemicals as well as relatively high concentrations of diverse types of metals and metalloids.**
- **The heavy metals pollutants identified in the plastic pieces were consistent with those determined in the soil, ash and sediment samples.** Organic chemical pollutants in the soil, ash and sediments were consistent with chemicals produced during the burning of plastic. **These findings demonstrate that the toxic chemicals identified in the areas analyzed were caused by the plastics dumped and burned in these locations.**
- **Chlorinated dioxins and furans** (polychlorinated dibenzo-p-dioxins and dibenzofurans) were found at high concentrations in the soil and ash samples. **These are known, in the long term, to lead to severe health conditions, including cancer, by accumulating within the body.**
- The total concentration of identified **dioxins and furans** in some of these soil samples are **the highest levels ever detected** in soil in Turkey to this day.
- In comparison to the control samples, which were collected from unpolluted soil from adjacent land, the concentrations of **dioxins and furans** determined in the survey areas were found to be approximately **400,000 times higher in Yüreğir/İncirlik field** and **8000 times in Seyhan/Yenidam field.**
- The total concentration of **polychlorinated biphenyls (PCBs) in the soil samples collected from Yüreğir/İncirlik** was found to be **30,000 times higher** than the soil sample collected as a control.
- **The concentration of polycyclic aromatic hydrocarbons (PAHs) determined in the soil samples collected from Yenidam was up to 35 times higher than the concentration of PAHs reported in previous studies of other regions in Turkey.**

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<sup>29</sup> More detailed information on this investigation can be accessed from the report in the [link](#). All analyses data can be accessed from the analytical report in the [link](#).

<sup>30</sup> Greenpeace Deutschland.Factsheet: Plastic Waste Exports to Turkey. 2021  
<https://www.greenpeace.de/publikationen/20210517-greenpeace-factsheet-plastikmuell-tuerkei.pdf>

<sup>31</sup> Greenpeace UK. Trashed. 2021. <https://www.greenpeace.org.uk/wp-content/uploads/2021/05/Trashed-Greenpeace-plastics-report-final.pdf>

- In four samples, **the concentration of one of the PAHs, benzo(a)pyrene** –known as human **carcinogen**– was **above limits** for [residential] soils established in Turkey. Two of them, Çukurova/ Karahan-2 (ash sample) and Yüreğir/İncirlik (ash sample), contained higher concentrations than both the values set for absorption through soil ingestion and skin contact and due to groundwater contamination. Benzo(a)pyrene concentration in **Çukurova/Karahan-2 (ash sample) was 6 and 3.6 times higher**, respectively, and in **Yüreğir/İncirlik (ash sample) 2.3 and 1.4 higher**, respectively, than the corresponding limit values specified in the Soil Pollution Control Regulation of Turkey.
- In all locations except for Seyhan/Kuyumcular, **chlorinated benzene compounds (e.g. hexachlorobenzene), some of which can disrupt the hemoglobin metabolism, cause skin lesions and liver disease (porphyria cutanea tarda) were found.**
- **Certain metals and metalloids were found at elevated concentrations across all sites**, including antimony, cadmium, copper, lead, molybdenum, tin, and zinc, all of which are known to occur in various types of plastics. Cadmium and lead are **toxic metals** that can persist in the environment long after release, and are able to **accumulate in the body following repeated exposures.**
- Despite the individual differences in terms of these heavy metals and metalloids at some locations, **the Kuyumcular site contained cadmium and molybdenum at between 30 and almost 200 times higher than the levels found in the control samples; Incirlik site contained copper up to 90 times higher than in the control, tin up to 140 times, and antimony at around 500 times higher.**
- **Heavy metals, like the cadmium and lead identified in this study, are a major concern for human and environmental health.**
- Some of the organic pollutants that were detected tend to remain in the soil for a long time. These pollutants can directly and indirectly contaminate nearby surface water, and can leak into underground water sources. **This pollution can potentially have hazardous impacts on the flora, the fauna (including microorganisms) and humans.** Lead has no safe level in the blood and is known to impact the nervous system. Lead exposure can cause mental impairment, behavioral disorders and learning difficulties in children.
- Dioxins and furans (polychlorinated dioxins and furans: PCDD/Fs), certain heavy metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and certain fire retardants (FR) are toxic chemicals. **Scientific studies have showed that they can have a health impact.**

**Some chemicals, which were also found in this study, can cause growth disorders in children, hormonal disorders, reproductive disorders, organ damage (liver and kidney), cardiovascular diseases, or respiratory disease, and can trigger various cancers.**





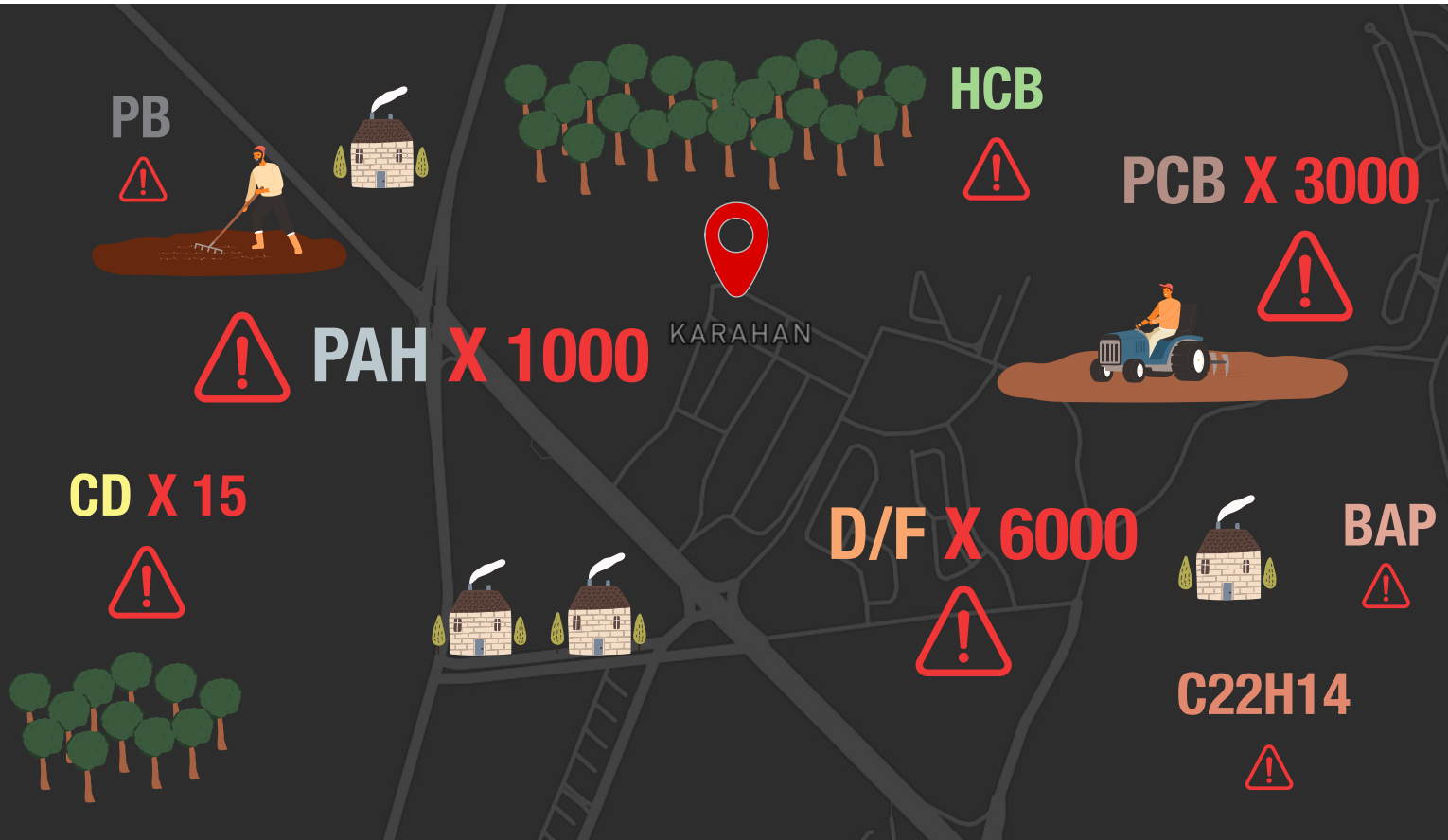


### 3. RESULTS BY LOCATIONS

The plastic waste samples collected from dumping and open burning sites located in Çukurova/ Karahan, Seyhan/Kuyumcular, and Yüreğir/İncirlik were found to contain various toxic organic chemicals as well as relatively high concentrations of diverse types of metals and metalloids.

#### LOCATION 1: Çukurova/Karahan-2 and Karahan-3

The Çukurova/Karahan-2 and Karahan-3 locations are in the middle of agricultural production areas. The locality also contains a large number of private properties (residential areas).



-  PB: Lead
-  HCB: Hexachlorobenzene
-  PCB: Poliklorlu Bifeniller
-  PAH: Polycyclic aromatic hydrocarbon
-  D/F: Dioxins, furans
-  BaP: Benzo[a]pyrene
-  C22H14: Dibenz(a,h) anthracene
-  CD: Cadmium



Analyzed materials: Shredded plastic, soil, ash

■ **Cadmium and lead concentrations** were found at **notably high levels** in the plastic waste samples collected from these study sites.

■ **Cadmium and lead levels** found in the ash were over **15 and 30 times typical uncontaminated soil concentrations**, respectively in **Karahan-2**, and **cadmium** in the ash from **Karahan-3** was approximately **5 times typical uncontaminated soil concentrations**. Cadmium is classified as **carcinogenic** for humans, and extended cadmium exposure can cause damage to the kidneys and bones. Lead is an extremely **toxic metal** that, if inhaled or ingested, affects nearly every organ and system inside the human body, particularly the nervous system.

■ In the Karahan-3 location, a high level of **dioxins/furans** was detected in the ash: **over 6000 times local background soil levels**. The type of dioxin found in this location can trigger cancer and can cause premature birth, stillbirth and syndromes like cleft palate.

■ Soil samples collected from both the Karahan-2 and Karahan-3 locations were found to contain **hexachlorobenzene**. Hexachlorobenzene is banned globally under the Stockholm Convention on Persistent Organic Pollutants. Hexachlorobenzene is classified as a **Group 2B carcinogen** (potentially carcinogenic to humans) by the International Agency for Research on Cancer (IARC). Hexachlorobenzene has been found to cause liver, kidney (kidney tubular tumors), and

thyroid cancers. Hexachlorobenzene bypasses the placenta, accumulates in fetal tissues, and can be transmitted to newborn babies through breast milk.

■ **The concentration of PAHs was particularly high** in the ash from the Karahan-2 site. Ash from this site had the highest level found in all the ash samples tested (thousands of times higher than local background levels).

■ **Benzo(a)pyrene**, a PAH which is designated as a **Group 1 carcinogen** by IACR, was identified at significant levels in ash from the Karahan-2 location.

■ **The concentration of Dibenzo(a,h)anthracene** which is designated as a **Group 2 carcinogen** by IACR, was **1.3 times the limit set** for absorption through soil ingestion and skin contact.

## LOCATION 2: Seyhan/Kuyumcular

The Seyhan/Kuyumcular study site is located at the entrance of Kuyumcular village, in the middle of citrus orchards. A private high school is situated nearby.



 **PAH X 12**



**CD X 50**




**Mo X 18**



 CD: Cadmium

 PAH: Polycyclic aromatic hydrocarbon

 Mo: Molibdenum





**Analyzed materials: Shredded plastic, soil, ash**

■ **Samples of waste plastic** from Kuyumcular contained a **broad range of organic chemicals**.

■ **The total concentration of 16 PAHs** in the soil sample collected from the Kuyumcular study site was **12 times higher than the control soil sample**.

■ Soil samples from the Kuyumcular site **contained a range of metals and metalloids** at higher concentrations than those in the control soil.

■ Soil samples from the Kuyumcular site contained **molybdenum**, at concentrations up to **18 times**

**the safe limit**<sup>32</sup> (determined by TKKY) for groundwater contamination.








■ **The cadmium level** detected in the soil sample collected from the Kuyumcular location was **40-50 times higher** than the quantities found in surrounding unpolluted soil.

<sup>32</sup> <https://webdosya.csb.gov.tr/db/cygm/icerikler/tkksdy-ekler-20180201144911.pdf>

### LOCATION 3: Seyhan/Yenidam

The Seyhan/Yenidam dumping location is at the side of a canal which is currently part of it concreted by the General Directorate of State Hydraulic Works. Next to it, there are chicken farms and agricultural production areas.



- |   |  |  |
|---|--|--|
|  PAH: Polycyclic aromatic hydrocarbon |  PCB: Polychlorinated biphenyl  |  D/F: Dioxins, furans |
|  HCB: Hexachlorobenzene               |  BHT: Butylated hydroxy toluene |  Cu: Copper           |
|   |  |  Sb: Antimony         |





**Analyzed materials: Water, sediment, soil, ash**

■ When the total **PCB concentration** and **dioxin furan values** were compared with their respective levels in the control soil sample for this area, the total PCB concentration was found to be **1000 times higher**, and the dioxin/furan values were **8000 times higher**.

■ **A high level of antimony**, a hazardous chemical used in polyester manufacture, was **found in waste plastic samples** from this site. Antimony trioxide is potentially **carcinogenic** for humans when it is inhaled.

■ **Hexachlorobenzene** was present in the ash.

■ **BHT was found in the water samples** collected from the Seyhan/Yenidam location. BHT is toxic, and it can induce allergic reactions to the skin. Long-term exposure to high doses of BHT can cause liver, thyroid and kidney problems, as well as affecting lung function and blood coagulation. BHT is also strongly associated with asthma and behavioral disorders in children.<sup>33, 34, 35</sup>

■ **PAHs** in the ash were **60 times above** the level in the control soil.

■ **Diethylene Glycol Dibenzoate**, a product used in PVC plastics, adhesives, paints, coatings, leather clothing and fillers was

also found in the Seyhan/Yenidam location.

■ **The sediment sample** collected from the Seyhan/Yenidam location showed a **high level of copper concentration**. High levels of exposure to copper can lead to toxic effects, including gastrointestinal distress. When copper enters surface waters, it can have toxic effects on aquatic organisms, many of which are very sensitive to copper even at very low levels.

<sup>33</sup> Kahl, R. (1992). Butylated hydroxytoluene toxicity. In *Lipid-soluble antioxidants: Biochemistry and clinical applications* (pp. 590-605). Birkhäuser Basel.

<sup>34</sup> Yamaki, K., Taneda, S., Yanagisawa, R., Inoue, K. I., Takano, H., & Yoshino, S. (2007). Enhancement of allergic responses in vivo and in vitro by butylated hydroxytoluene. *Toxicology and applied pharmacology*, 223(2), 164-172.

<sup>35</sup> Madhavi, D. L., & Salunkhe, D. K. (1995). Toxicological aspects of food antioxidants. In *Food antioxidants* (pp. 281-374). CRC Press.



**LOCATION 4: Yüreğir/İncirlik [THE MOST CONTAMINATED AREA]**



İncirlik dumpsite is within the borders of Yüreğir district and located in the middle of open agricultural fields in the south of Adana-Ceyhan road. There are peanut and cornfields around the area. In addition, there is an irrigation canal between the area and the E-5 road, and there are animal feed factories around the irrigation canal.



Cu: Copper

Sb: Antimony

Sn: Tin

D/F: Dioxins, furans

PAH: Polycyclic aromatic hydrocarbon

HCB: Hexachlorobenzene

PCB: Polychlorinated biphenyl

## Analyzed materials: Water, soil, ash, shredded plastic

■ Samples of ash and underlying soil from the İncirlik location had the **highest number and variety of organic chemicals** of all the samples collected from all study sites.

■ The total concentration of **16 PAHs** in the soil sample from this location was found to be approximately **ten times higher** than the soil concentrations at other sites investigated in this study (polluted soils).

■ **The levels of PCBs and dioxins/furans** in the samples of ash and soil collected from the İncirlik study site were **the highest** among all analyzed samples. The concentration detected in the soil was even higher than in the ash. This demonstrated that there has been ongoing open burning activity here for a long time.

■ **The PCB concentration** in the soil sample was **30,000 times higher** than the control sample, with toxic equivalency almost **5 million times higher** than that found in the control soil.

■ The soil in the İncirlik study site had the **highest toxicity equivalency**

for **dioxin/furan** of all the samples. It was approximately **400,000 times higher** than detected in the control soil sample.

■ The İncirlik area is the most polluted of all the study sites in terms of **metals and metalloids**. **The lead concentration** found in the ash samples collected from this location was more than **100 times higher** than typical concentrations in the unpolluted soil. **Tin, antimony, and copper levels were 20 to 70 times higher** than the typical background soil.

■ In the İncirlik location, **a higher concentration of a number of metals and metalloids** including cadmium, copper, tin, and zinc, was found in the soil samples beneath the burning sites, in comparison to the ash samples. This shows that plastic dumping and burning activities in the related areas have been ongoing uncontrolled for a long time.

■ **A high concentration of copper** (2030 mg/kg) was found in one of the subsamples of mixed plastic samples from this site.

■ **The level of antimony** in the soil samples collected from this location was **600 times higher** than in the control soil.

■ A number of **organic chemicals** used in plastics manufacture (e.g. **organophosphates, phthalate esters** as well as **two chlorinated organophosphates**) were identified in surface water collected from a pond within this site. Some of these chemicals are known to be endocrine disrupting.

■ A number of **chlorinated and brominated compounds** including **Hexachlorobenzene (HCB)** were found in soil at the İncirlik site. HCB is a persistent chemical that can bioaccumulate in the food chain and is toxic to a wide range of organisms, including humans. It is also listed as a persistent organic pollutant under the Stockholm Convention in Annex A (Elimination) and as one of the air pollutants under the UNECE Convention on Long-range Transboundary Air Pollution (Air Convention).

## 4. CONCLUSION

- This study reveals extensive contamination with hazardous chemical pollutants caused by the illegal dumping and open burning of imported plastic waste at five different locations in Turkey's Adana province. **The pollutants – comprising many hazardous organic chemicals, as well as heavy metals and metalloids – were found both in soil at the sites and in the ashes created by burning practices.**
- The analyses conducted on the **ash residues from these five locations shows that contamination was predominantly due to organic chemical pollutants produced during the combustion process of plastics, as well as metal and metalloid pollutants present in the plastic waste.** Some of the organic chemical pollutants identified in the area are not only toxic but highly persistent, and can biologically accumulate once they enter the food chain. Contamination similar to that in the ash was also found in the soil under the ash, indicating that these **highly toxic chemical pollutants were transferred to the soil** in these dumping sites after being formed as a result of burning.
- **After the samples were gathered, plastic waste and the ashes formed after combustion have been partially cleared in some of these areas.** The authorities should publicly detail how the relevant dangerous materials were handled and disposed of, as well as what public health and environmental health precautions are taken. While some of the ash and plastic waste has been partially removed, the polluted soil residues remain below and require urgent attention. This contaminated soil continues to pose a significant risk to the environment and to human health. The authorities need to clearly and unequivocally explain the disposal method used for the contaminated ash. Otherwise, the area that the waste is transferred to, the employees transferring the waste, and **the settlements along the way may have been contaminated with materials containing high levels of polychlorinated dibenzodioxins/furans (PCDD/Fs), some of which are highly toxic.**
- **In order to prevent the toxic chemicals identified in these areas from contaminating soil, air, water, and even the food chain, plastic waste importation must be completely banned.** The authorities should investigate whether areas similar to the Adana example exist across the country, and if so, these areas should be cleared safely and responsibly. Looking more broadly, the production and use of plastics should be addressed. Steps should be taken to prevent toxic chemical usage in manufacturing and disposable plastics should be gradually eliminated, in order to significantly reduce and eventually stop plastic waste production.



The case of Adana demonstrates that the plastic waste trade, which could be defined as garbage colonialism, exposes the ecosystems of the Global South, as well as the people living there, to high levels of hazardous chemicals from the garbage of developed countries.



Water will remember / Air will remember





# 5. RECOMMENDATIONS

The following are the recommendations of Greenpeace Mediterranean in light of the findings determined within this study.

## For International Public Opinion and Waste Exporting Countries

- 1. Ban plastic waste exports:** The fact that unless the UK and German governments do not ban plastic waste exports to both OECD and non-OECD countries gives concerns for the illegal dumping and open burning activities identified in Turkey will continue in the future. Plastic waste exports must be banned. This is a requirement of the “precautionary approach”, which is one of the basic approaches of international environmental legislation.  
  
Both this research and the research published by Greenpeace Malaysia in 2020<sup>36</sup> have shown that plastic waste exports have negative environmental consequences in recipient countries, whether exported to OECD or non-OECD countries. Exporting countries are responsible for this environmental pollution and environmental crime as importing countries are.
- 2. Principles of “polluter pays” and “prevention”:** Germany and the UK, as a main exporting countries, are responsible for this environmental crime and preeminently responsible for solving the environmental problems caused by inappropriate plastic waste disposal in Turkey and other affected importing countries. This is in line with the principles of “polluter pays” and “prevention”.  
  
The first step for the states whose waste has proven to be polluting the environment should contribute to the cost of proper waste disposal and cleanup of uncontrolled dumping areas in Turkey.
- 3. Investigations and controls:** Until export bans are in place in the exporting countries, effective monitoring and enforcement of the waste export industry is essential. Therefore, funding and personnel for monitoring and enforcement should be increased immediately to combat possible corruption, fraud, and illegal practices by licensed or unlicensed operators exporting waste to Turkey. Controls cannot be seen as an ultimate solution, nor detract from complete export bans – it would be logistically impossible to monitor and conclude with certainty what is being exported due to the volume of waste, the number of containers, and space at ports.
- 4. Transparency,** is one of the most effective ways to prevent illegal and environmentally harmful waste management. In addition, the public has the right to know where their waste goes, where and how it is disposed of. There is a need for a standardized and streamlined online real-time reporting process that all stakeholders can access at any time. Establishing an integrated tracking system with all countries, monitoring waste export data in real time, would be a huge step towards preventing illegality.

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<sup>36</sup> Greenpeace Malaysia, The Recycling Myth 2.0,



- 5. Refill and reuse system:** An action plan to develop alternatives based on refillable and reusable systems should be put into practice (such as deposit return schemes). Priority should be given to a plastic pollution reduction plan that will radically reduce the production of single-use plastics, which is the most commonly found plastic in illegal dumping and open burning areas identified in Turkey.
- 6. Single use phase-out:** Exporter countries, such as the UK and Germany, should urgently set and establish a delivery plan for a target to reduce single-use plastic, which should place particular emphasis on resource efficiency and waste minimization.
- 7.** Exporter countries should introduce Extended Producer Responsibility (EPR) schemes designed to increase reuse and reduction of packaging as well as to eliminate non-recyclable plastics. This should be achieved through a combination of reuse and reduction targets and modulation of fees to incentivize eco-design, reuse and reduction and to penalize single-use packaging. Until waste export bans are in place, EPR measures should also hold the producer responsible for knowing that the waste they produce, if exported, is disposed of legally.
- 8.** Internationally applicable models should be generated by introducing new controls on companies that manufacture and use unnecessary single-use plastic packaging for products, and by requiring companies to track products from the cradle to the grave to ensure transparency about plastic use, disposal and recycling.



## To The Turkish Ministry of Environment, Urban Planning and Climate Change

- 1. Zero waste importation:** As The Minister of Environment, Urbanization and Climate Change said at the end of 2019, Turkey should reach its goal of zero waste imports as soon as possible and immediately ban the import of all plastic waste.

In accordance with the Turkish Zero Waste Regulation, separate collection systems at the source of local waste should be expanded. Single-use plastics should be removed from use within a plan, and their production should be limited.

- 2. Further investigations and rehabilitation plan:** The Ministry of Environment, Urbanization and Climate Change should carry out more detailed investigations in the affected areas. In particular, they should examine the risk of hazardous substances leaking into air, soil, and water resources.

A comprehensive rehabilitation action plan should be developed. This should involve the participation of citizens living in the region to clean and rehabilitate contaminated areas where imported plastic garbage is illegally dumped and burned.

- 3. Research Commission:** The Presidency of the Turkish Grand National Assembly should establish a research commission to investigate the environmental destruction that results from illegal activities, with special emphasis on illegal and bad practices related to plastic pollution and plastic waste management.

- 4. Health impact studies:** The Ministry of Health should carry out studies into the health impact of the pollution from imported plastic garbage, and provide preventive health support to the affected residents against possible adverse effects. The Ministry of Food, Agriculture, and Livestock should take seriously the potential of contaminated agricultural lands and irrigation water due to illegal plastic waste dumping and open burning activities near agricultural production areas. It should initiate studies to demonstrate that the relevant areas are risk-free in terms of food safety.

- 5. Transparency:** The Ministry of Trade should explain in real-time, and in a transparent manner, the volume and nature of plastic waste that particular companies are importing from each country. Together with the Ministry of Environment, Urbanization, and Climate Change, these waste importing companies should state how much they produce and how much process waste they produce. The Ministry should establish a system in which the fate of these process wastes can be monitored and make it available to all.

**More detailed information on this investigation<sup>37</sup> can be accessed from the report in the [link](#). All analyses data<sup>38</sup> can be accessed from the analytical report in the [link](#).**

<sup>37</sup> Greenpeace Akdeniz, Game of Waste, 2022

<sup>38</sup> Greenpeace Research Laboratories (GRL) Analytical Results 2022-01, Hazardous chemical contaminants in samples of surface water, soil, ash, sediment and waste plastic from waste dumpsites in Turkey, January 2022

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# ABBREVIATIONS

**BAN:** Basel Action network

**BHT:** Butylated hydroxytoluene

**FR:** Fire retardant

**HCB:** Hexachlorobenzene

**IARC:** International Agency for Research on Cancer

**mg/kg:** Milligram per kilogram

**OECD:** Organisation for Economic Co-operation and Development

**PAH:** Polycyclic aromatic hydrocarbon

**PBDD/F:** Polybrominated dibenzodioxins/furans

**PBDE:** Polybrominated diphenylether

**PCB:** Polychlorinated biphenyl

**PCDD/F:** Polychlorinated dibenzodioxin/furan

**PE:** Polyethylene

**POP:** Persistent organic pollutants

**PVC:** Polyvinyl chloride

**TKKY:** Regulation Regarding Point Source Land Pollution and Soil Contamination Control







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