Forum: Environmental Assembly

Issue: Marine and water pollution as a danger to food security

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I. Introduction

As international crises, conflicts and catastrophes surround us, one thing never changes: the need for food. A reliable access to adequate food is the one thing that every person, no matter the war, natural disaster or epidemic they may find themselves in, needs to stay alive. As the global population increases, two things increase with it: the demand for food, and the pollution of our environment, which endangers that food. Two billion people face some form of food insecurity, it is estimated.[1] While several Sustainable Development Goals indirectly address marine and water pollution and food security[2], none address both topics together. This is crucial, however, for marine and water pollution pose a direct danger to food security.

Crops irrigated with polluted water have lower yields, or contain harmful toxicants. Plastic in the oceans chokes animals, or is mistaken for food, causing animals to starve. This lowers the availability of seafood which many depend on for income and sustenance. Anything humans introduce into our environment that shouldn't be there finds its way back to us, often with devastating consequences. Pollutants discarded today may only affect us in future years. As we consider how water pollution affects food security, and the measures that can be taken against it, this still fresh subject is as relevant to the future as any.

By understanding and combating marine and water pollution as a danger to food security, we can create a safer world for all, and therefore a more secure future.

II. Definition of Key Terms

A. Food security

Food security is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs

[1] United Nations Environment Programme (UNEP). 2021. *Food Security and Water Quality: Technical Highlights from the World Water Quality Alliance*. Nairobi: UNEP. https://www.unep.org/interactives/wwqa/technical-highlights/food-security-and-water-quality

[2] United Nations. 2025. "The 17 Goals." *Sustainable Development Goals*. Accessed April 20, 2025. https://sdgs.un.org/goals.

and food preferences for an active and healthy life. The four main dimensions of food security are: the physical availability of food, which is determined by levels of food production, stock levels and trade net; the economic and physical access to food; the utilisation of food, meaning good preparation of food, a diverse diet, and the ability to digest and absorb nutrients; and stability in all three of the prior dimensions. Weather conditions, political instability, economic factors such as rising prices or unemployment, and pollution may impact food security statuses.[3]

B. Nonpoint source pollution

Nonpoint source pollution is pollution that occurs as a result of runoff. It comes from croplands, suburban areas, industrial sites, or elsewhere, and is usually carried into water when it rains, or when snow melts.[4] Because it is a combination of different sources, it is difficult to identify and address.[5]

C. Point source pollution

"The U.S. Environmental Protection Agency (EPA) defines point source pollution as 'any single identifiable source of pollution from which pollutants are discharged, such as a pipe, ditch, ship or factory smokestack.'"[6]

D. Marine pollution

Marine pollution is the direct or indirect introduction by humans of substances such as chemicals, waste, and invasive organisms, or energy, such as noise and heat, into the marine environment. This often results in adverse effects such as harm to marine life, risks to human health, and degradation of seawater quality.[7][8]

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[3] World Bank. *What Is Food Security?* Accessed April 20, 2025. https://www.worldbank.org/en/topic/agriculture/brief/food-security-update/what-is-food-security.

[4] National Oceanic and Atmospheric Administration (NOAA). 2021. "Nonpoint Source: Pollution Tutorial." *National Ocean Service*. Accessed April 21, 2025. https://oceanservice.noaa.gov/education/tutorial_pollution/04nonpointsource.html.

[5] National Geographic Society. 2024. "Point Source and Nonpoint Sources of Pollution." *National Geographic Education*. Last modified October 1, 2024. https://education.nationalgeographic.org/resource/point-source-and-nonpoint-sources-pollution/.

[6] National Oceanic and Atmospheric Administration (NOAA). 2021. "Point Source: Pollution Tutorial." *National Ocean Service*. Accessed April 21, 2025. https://oceanservice.noaa.gov/education/tutorial_pollution/03pointsource.html.

[7] "Marine Pollution." *National Geographic Education*, https://education.nationalgeographic.org/resource/marine-pollution/. Accessed 17 April 2025.

[8] European Environment Agency (EEA). 2021. "Marine Pollution." *European Environment Agency*. Accessed April 21, 2025. https://www.eea.europa.eu/help/glossary/eea-glossary/marine-pollution.

III. General Overview

A. Historical context of marine and water pollution as a danger to food security

Oceans and other bodies of water have long been polluted by humans. The first documentations of ocean pollution are of ancient Greeks and Romans dumping sewage into the Mediterranean Sea.[9] The Industrial Revolution brought a great spike in pollution which grew from the 18th century to the present day, as the increase in mass production in factories brought with it great amounts of industrial waste. This waste was dumped into waterways, which were used as drinking water and for irrigating fields. Sewage, slag, coal, sulfuric acid, debris, and oils[10] were among the pollutants washed into oceans, not only destroying ecosystems, but also mixing into fields and thus into people's diets. The increase in global trade meant that the increase in ships in the oceans resulted in more oil spills, and sewage and other wastes being dumped into oceans.

Marine and water pollution has increasingly been a threat to human health and food security, contaminating or killing seafood, degrading agricultural water sources, and destroying aquatic ecosystems. In the 20th century, major oil spills, such as the Alaskan Exxon Valdez spill in 1989[11], and industrial waste crises, such as the Japanese Minamata Disease in 1956[12] led to international agreements seeking to control aquatic pollution, including Marpol, the London Convention, and the Barcelona Convention. In the last twenty years, the increase in research on the topic has brought the rising concern around microplastics in marine food chains, and about ocean acidification and warming, caused by pollution, having negative impacts on marine life.[13]

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[9] Seas & Straws. 2025. "The History of Ocean Pollution." *Seas & Straws*. Accessed April 20, 2025. https://www.seasandstraws.com/history-of-ocean-pollution.html.

[10] National Oceanic and Atmospheric Administration. 2025. "A Brief History: Pollution Tutorial." *NOAA National Ocean Service*. Accessed April 20, 2025. https://oceanservice.noaa.gov/education/tutorial_pollution/02history.html.

[11] National Oceanic and Atmospheric Administration. 2020. "Exxon Valdez." *NOAA Damage Assessment, Remediation, and Restoration Program*. Accessed April 20, 2025. https://darrp.noaa.gov/oil-spills/exxon-valdez.

[12] Harada, Masazumi. 1995. "Minamata Disease: Methylmercury Poisoning in Japan Caused by Environmental Pollution." *Critical Reviews in Toxicology* 25 (1): 1–24. https://pubmed.ncbi.nlm.nih.gov/7734058/.

[13] National Oceanic and Atmospheric Administration. 2025. "Ocean Acidification." *NOAA Education*. Accessed April 20, 2025. https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification.

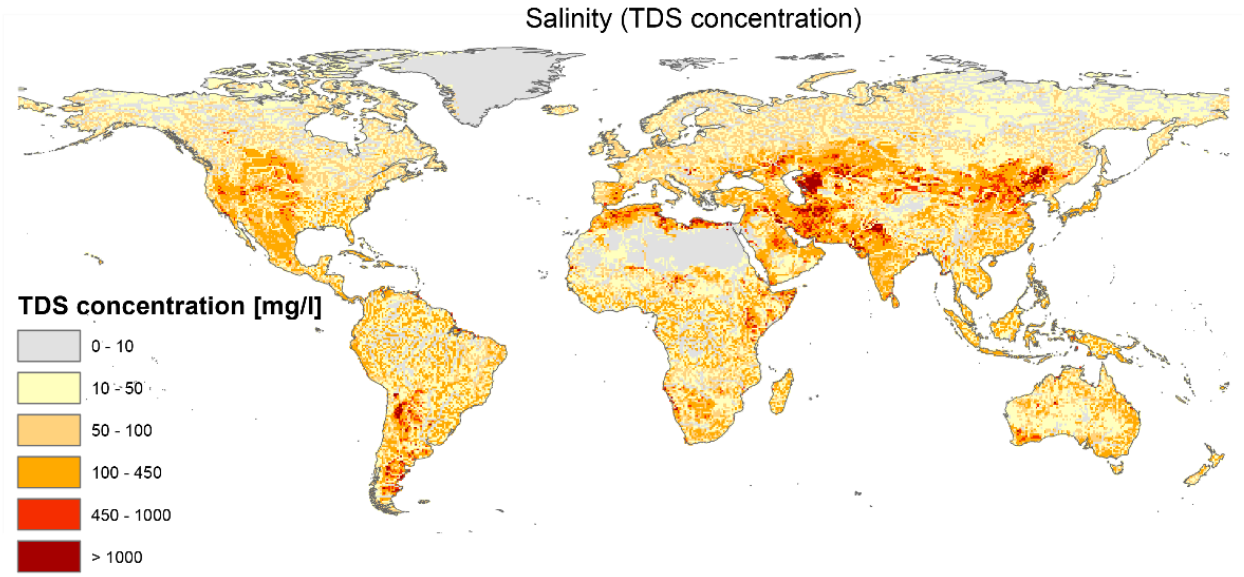
B. Major pollutants and their causes

Arsenic in groundwater, while an international problem, is the most common in Southeast Asia. Arsenic seeps from rocks and sediments into groundwater in the whole world, but aquifers often release arsenic in South Asia particularly. About 150,000 km² of agricultural land in South Asia is irrigated with groundwater that exceeds the WHO guideline value. Long term ingestion of arsenic can lead to arsenic poisoning.

Salinity is one of the greatest threats, as saline water causes salt to accumulate in soil. This causes yield losses, and decreases the crop quality. About 11 percent of the global irrigated area is affected by salinization, 77 percent of which is in Asia. Particularly semi-arid regions are at risk. The main causes of salinization, besides the natural accumulation of salts in soils, are human interventions, such as road de-icing, industrial and mining operations, wastewater treatment, and return flow from irrigation, and over-extraction of groundwater aquifers.

Eutrophication is a chain reaction that occurs when excess nutrients accumulate in a body of water and cause an increased growth of organisms, which deplete the water's oxygen.[14] This lowers the seawater's pH, causing ocean acidification, slowing the growth of marine animals, and reducing the catch of fisheries. It can also cause dead zones, in which no organisms grow as there is not enough oxygen in the water.[15] Algal blooms occur when excessive amounts of toxin-producing algae grow in a body of water.[16] These also reduce the amount of oxygen in the water, destroying the habitat of many other organisms.

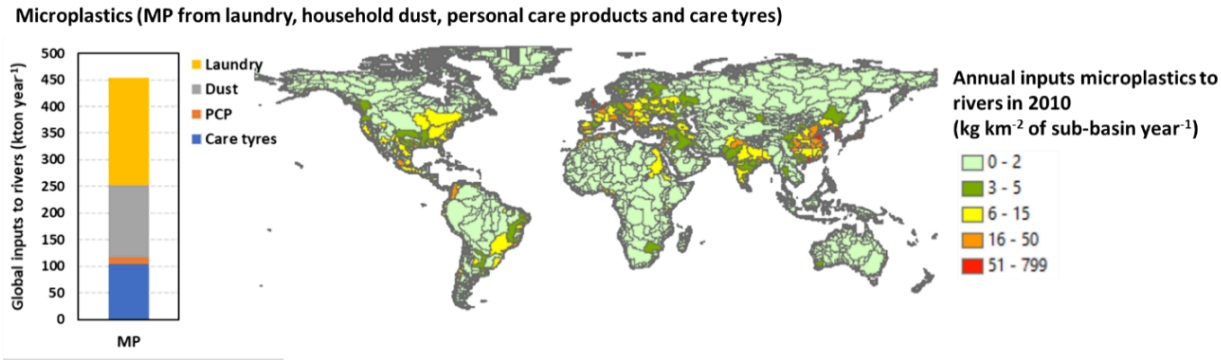
[14] National Oceanic and Atmospheric Administration. 2025. "What Is Eutrophication?" *NOAA National Ocean Service*. Accessed April 20, 2025. https://oceanservice.noaa.gov/facts/eutrophication.html.
[15] National Oceanic and Atmospheric Administration. 2025. "What Is a Dead Zone?" *NOAA National Ocean Service*. Accessed April 20, 2025. https://oceanservice.noaa.gov/facts/deadzone.html.
[16] National Institute of Environmental Health Sciences. 2025. "Algal Blooms." *National Institute of Environmental Health Sciences*. Accessed April 20, 2025. https://www.niehs.nih.gov/health/topics/agents/algal-blooms.



Global surface water salinity hotspots (average simulated in-stream TDS (concentration of total dissolved solids, a metric of salinity in rivers) concentrations). Regions with water availability less than 1 m3s-1 are masked (white). Details are provided in the supplementary information of van Vliet et al. (2020).[17]

The approximate 75-199 million tons of plastic in oceans cause 100,00 marine animals to die every year, and one in three fish caught for human consumption to contain plastic.[18] Plastic poses many dangers to marine life: it entangles mammals and fish, causing starvation, injury or asphyxiation. It is often ingested by marine animals who mistake it for food. These may die, as they ingest enough plastic to fill their stomach, and cannot eat any food. This is a threat to 3 billion people that depend on seafood for animal protein[19], as lower catches raise food prices and lower food availability. Plastics can be ingested by an animal which gets eaten, and thus travels through the food chain, and gets eaten by humans. While the full extent of the effects of microplastics on humans is not known, it affects the endocrine system, and causes cancer.[20]

[17] United Nations Environment Programme. 2025. "Food Security and Water Quality." *UNEP*. Accessed , 2025. https://www.unep.org/interactives/wwqa/technical-highlights/food-security-and-water-quality.
[18] Condor Ferries. 2025. "Plastic in the Ocean Statistics & Facts 2025." *Condor Ferries*. Accessed April 20, 2025. https://www.condorferries.co.uk/plastic-in-the-ocean-statistics.
[19] World Wildlife Fund. 2025. "Sustainable Seafood." *World Wildlife Fund*. Accessed April 20, 2025. https://www.worldwildlife.org/industries/sustainable-seafood.
[20] Fauna & Flora. 2025. "How Does Plastic Pollution Affect Marine Life?" *Fauna & Flora*. Accessed April 20, 2025. https://www.fauna-flora.org/explained/how-does-plastic-pollution-affect-marine-life/.



Urban-related inputs of microplastics to rivers in sub-basins worldwide. Results based on the MARINA-Global model (Strokal et al. 2019; van Wijnen et al. 2017; Siegfried et al. 2017), aggregated to sub-basins for the year 2010.[21]

C. Marine and water pollution in agriculture

Agriculture is an industry that is especially affected by marine and water pollution, and one that especially affects food security. 40 percent of crop production comes from irrigated land. The use of contaminated irrigation water is prevalent in at least 10 percent of that, some estimates say.[22] Polluted rivers, lakes and groundwater used for irrigation can contain heavy metals[23], pathogens, and chemicals,[24] especially those already in excess from agricultural processes; if introduced in crops, these contaminants can reduce crop yields and make the crops less qualitative, or even dangerous.

Eutrophication from agricultural runoff and soil degradation, like salinization, mentioned in the prior section, are also common problems in agriculture.

IV. Major Parties Involved

A. Food and Agriculture Organisation (FAO)

The Food and Agriculture Organisation (FAO) is a specialized agency of the United Nations with 195 members, whose goal is to achieve food security for all, and leads

[21] UNEP. 2025. "Food Security and Water Quality." United Nations Environment Programme. Accessed April 20, 2025. https://www.unep.org/interactives/wwqa/technical-highlights/food-security-and-water-quality.
[22] Alegbeleye, Oluwadara O., and Anderson S. Sant'Ana. 2021. "Risks Associated with the Consumption of Irrigation Water Contaminated Produce: On the Role of Quantitative Microbial Risk Assessment." *Current Opinion in Food Science* 41: 88–98. https://doi.org/10.1016/j.cofs.2021.03.013.
[23] Ullah, Zahid, Abdur Rashid, Junaid Ghani, Javed Nawab, Xian-Chun Zeng, Muddaser Shah, Abdulwahed Fahad Alrefaei, Mohamed Kamel, Lotfi Aleya, Mohamed M. Abdel-Daim, and Javed Iqbal. 2022. "Groundwater Contamination through Potentially Harmful Metals and Its Implications in Groundwater Management." *Frontiers in Environmental Science* 10. https://doi.org/10.3389/fenvs.2022.1021596.
[24] Tongesayi, Tsanangurayi, and Sunungurai Tongesayi. 2015. "Contaminated Irrigation Water and the Associated Public Health Risks." In *Food, Energy, and Water*, edited by Satinder Ahuja, 349–81. Amsterdam: Elsevier. https://doi.org/10.1016/B978-0-12-800211-7.00013-2.

efforts to defeat hunger.[25] It tracks food security and fisheries data, providing important information for research concerning this report's topic, and conducts some of this research itself.

B. Bangladesh

Bangladesh, one of the world's most climate-vulnerable countries, faces serious threats to food security due to marine and freshwater pollution. Fertilizer runoff, textile waste, and industrial discharge contaminate inland water bodies, affecting fish farms and rice fields. In response, Bangladesh has partnered with the United Nations Development Programme (UNDP) and FAO to implement cleaner irrigation systems and improve waste treatment in rural areas.[26] Regional actors like the Asian Development Bank and NGOs such as the WWF are active in restoring rivers like the Buriganga, working with local authorities and farming communities. The WWF also promotes sustainable aquaculture in the Bay of Bengal, protecting local livelihoods.[27]

C. Peru

As a major player in global fish exports, Peru has been directly impacted by overfishing and ocean pollution, particularly along the Pacific coast. Polluted runoff and waste from fish-processing plants threaten marine biodiversity and long-term food security. The European Union has partnered with Peru under bilateral trade and environmental agreements to improve fisheries regulation.[28] NGOs like Greenpeace have also spotlighted illegal dumping and overexploitation in the region. Together with the FAO, Peru is developing better coastal monitoring systems and pushing for reforms in the fishing industry to align with sustainable practices.[29]

D. Indonesia

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[25] Food and Agriculture Organization of the United Nations (FAO). 2025. "About FAO." *FAO*. Accessed April 20, 2025. https://www.fao.org/about/about-fao/en/.

[26] FAO. *The State of World Fisheries and Aquaculture 2022.* Accessed 20 April 2025. https://www.fao.org/documents/card/en/c/cc0461en.

[27] WWF. Sustainable Aquaculture. Accessed 20 April 2025. https://www.worldwildlife.org/industries/sustainable-seafood.

[28] European Commission. EU–Peru Trade Agreement: Environment and Sustainability. Accessed 20 April 2025.https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/countries-and-regions/andean-community_en.

[29] Government of Indonesia. National Action Plan on Marine Debris. Accessed 20 April 2025. https://marinedebris.id.

Indonesia is the world's second-largest contributor to marine plastic pollution, yet also one of the most seafood-dependent nations. The government has launched a National Action Plan on Marine Debris and committed to reducing ocean plastic waste by 70% by 2025. This effort is supported by the UNEP and international NGOs such as Greenpeace, which conducts awareness campaigns and supports community-led beach cleanups. The Association of Southeast Asian Nations (ASEAN) also promotes collaboration among member states on water quality and food security. With these efforts, Indonesia is striving to secure its fishing economy while addressing the environmental and public health impacts of polluted waters.[30]

V. Timeline of Events

Date	Event
1750 - 1900	The Industrial Revolution took place, in which water pollution increased, commonly in the form of sewage, chemicals, and heavy metals directly or indirectly entering bodies of water and food production.[31]
1972	The London Convention is an agreement to control marine pollution, especially by the dumping of wastes.[32]
1976	The Barcelona Convention adopted a framework to prevent and combat pollution in the Mediterranean Sea area, protecting the marine environment and cooperating for sustainable development.[33]
1973 - 1978	The International Convention for the Prevention of Pollution from Ships (MARPOL) sets regulations to prevent ships from polluting the marine environment due to operational or accidental causes.[34]

[30]Asian Development Bank. ADB and Bangladesh: Water Resource Management. Accessed 20 April 2025. https://www.adb.org/where-we-work/bangladesh.
[31]Hayes, Amy. "The Troubles of Pollution: Environmental Impact of Industrialization." https://www.thecollector.com/environmental-impact-industrial-revolution-pollution/. Accessed 19 April 2025.
[32]International Maritime Organization. 2025. "London Convention and Protocol." *International Maritime Organization*. Accessed April 20, 2025. https://www.imo.org/en/OurWork/Environment/Pages/London-Convention-Protocol.aspx.
[33] United Nations Environment Programme. 2025. "Barcelona Convention and Protocols." *UNEP/MAP*. Accessed April 20, 2025. https://www.unep.org/unepmap/who-we-are/barcelona-convention-and-protocols.
[34] International Maritime Organization. 2025. "International Convention for the Prevention of Pollution from Ships (MARPOL)." *International Maritime Organization*. Accessed April 20, 2025. https://www.imo.org/en/about/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx.

2000+	Concern emerges about microplastics posing a danger to food security.[35]
2009	The Coral Triangle Initiative (CTI-CFF), a multilateral partnership, was formed by six bordering countries in southeastern Asia, with the purpose of ensuring that coral reefs and their ecosystems remain intact and sources of livelihood and food security for over 130 million[36] people amid climate change,[37]
2015	The United Nations Sustainable Development Goals 2 (zero hunger), 6(clean water and Sanitation), and 14 (life below water) connect the state of the environment to food systems, raising awareness and calling for action.[38]
2024	The Global Commission on the Economics of Water reported that half of the world's food production will risk failure by 2050 due to a water crisis, unless more is done to preserve fresh water supplies.[39]

VI. Previous & Possible Solutions

A. Regulatory Bodies

Organisations such as the United Nations Environment Programme (UNEP), International Maritime Organization (IMO), Food and Agriculture Organization (FAO), and United Nations Convention on the Law of the Sea (UNCLOS) set standards and regulations aimed at reducing pollution that threatens marine ecosystems and food security. Increased international cooperation develops unified standards that reduce regulatory gaps, making it easier for member states to implement effective regulations of pollution. This is especially important because bodies of water and seas often cross borders.

B. United Nations Sustainable Development Goals

Goals 2 (zero hunger), 6 (clean water and Sanitation), and 14 (life below water) connect the state of the environment to food systems, raising awareness and calling for action.[40]

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[35] Seltenrich, Nate. 2015. "New Link in the Food Chain? Marine Plastic Pollution and Seafood Safety." *Environmental Health Perspectives* 123 (2): A34–A41. https://doi.org/10.1289/ehp.123-A34.

[36] Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security. 2025. "Frequently Asked Questions." *Coral Triangle Initiative*. Accessed April 20, 2025. https://www.coraltriangleinitiative.org/frequently-asked-questions-0.

[37] United Nations. 2025. "Coral Triangle Initiative." *United Nations Sustainable Development Goals*. Accessed April 20, 2025. https://sdgs.un.org/partnerships/coral-triangle-initiative.

[38] United Nations. 2025. "The 17 Goals." *Sustainable Development Goals*. Accessed April 20, 2025. https://sdgs.un.org/goals.

[39] Harvey, Fiona. 2024. "Global Water Crisis Leaves Half of World Food Production at Risk in Next 25 Years." *The Guardian*, October 16, 2024. Accessed April 20, 2025. https://www.theguardian.com/environment/2024/oct/16/global-water-crisis-food-production-at-risk.

[40] United Nations. 2025. "The 17 Goals." *Sustainable Development Goals*. Accessed April 20, 2025. https://sdgs.un.org/goals.

C. Stricter international regulations and enforcement

The use of emerging pollutants, "chemicals or biological agents that are detected in the environment and potentially hazardous or recently determined to be hazardous to humans and ecosystem"[41], and microplastics, should not only be regulated more tightly so as to limit them entering the food system, as the effects of these contaminants are not fully understood, the regulations should be enforced more strictly, as the lack of enforcement in many member states has led to a lack of incentive to comply with regulations.[42] International pressure and support, as well as incentives for sustainable practices and compliance with regulations, such as financial incentives, can make countries adopt and enforce regulations. International pressure and support, as well as incentives for sustainable practices and compliance with regulations, such as financial incentives, can make countries adopt and enforce regulations.

D. Polluter pays principle

The polluter pays principle says that the costs of pollution should be paid by those causing it, not those who suffer from it. This can incentivise individuals or groups to avoid causing environmental damage, and can be used to restore damage caused by pollution. It has been effectively adopted in the United States[43], European Union[44], and China[45]. However, there must be clear evidence of the harm, and a clear identification of the polluter, who may attempt to hide that they are responsible. Additionally, it may be difficult to find an appropriate price for the pollution or its harm, as they may be abstract.

E. Investment in solid waste collection and management and wastewater treatment

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[41] Wang, Xiaohan, Zichen Tang, Xinchang Wang, Xiaolu Zhang, and Qi Zhang. 2024. "Emerging Contaminants in the Aquatic Environment: Sources, Impacts, and Remediation Technologies." *Environmental Science and Ecotechnology* 20: 100285. https://www.sciencedirect.com/science/article/pii/S266667582400050Xa.

[42] Miller, Elizabeth. 2012. "Solutions for the Ineffective Enforcement of MARPOL Annex V." *Hastings International and Comparative Law Review* 35 (2): 383–404. https://repository.uclawsf.edu/cgi/viewcontent.cgi?article=1771&context=hastings_international_comparative_law_review.

[43] Earth.Org. 2023. "Explainer: What Is the Polluter Pays Principle and How Can It Be Used in Climate Policy?" *Earth.Org*, July 17, 2023. https://earth.org/explainer-what-is-the-polluter-pays-principle-and-how-can-it-be-used-in-climate-policy/#:~:text=The%20polluter%20pays%20principle%20is%20applied%20commonly%20in%20environmental%20law,and%20Control%20of%20Pollution%20Act.

[44] Regebro, Ellen. 2010. *The Polluter Pays Principle in the European Waste Framework Directive*. Lund University. https://www.lunduniversity.lu.se/lup/publication/1628122.

[45] Hamman, Evan, Liping Pei, and Denise Burloff. 2018. "The Polluter Pays Principle in Chinese Environmental Law." *Chinese Journal of Environmental Law* 2 (1): 57–82. https://doi.org/10.1163/24686042-12340022.

Mismanaged waste is a large source of plastic pollution. Pollution discharged by wastewater treatment often directly causes pollution in freshwater systems. Policies should improve collecting and managing solid waste (e.g. circular economy) and wastewater treatment, and financial investments can be made to do so.[46]

F. Increased research and data

Not enough research and thus data is available on the topic of marine and water pollution as a danger to food security. Specifically understanding of the effects of response strategies, natural and human-driven processes' interaction with food production and safety is needed.[47] This lack of information increases the difficulty of making regulations and enforcing them.[48]

G. Education

Including sustainability and climate resilience, as well as ensuring that youth understand and are able to address the long-term threats water pollution has on food security is vital, and is a sustainable approach to building a resilient future.

VII. Conclusion

For one in four people on Earth, food security is still a luxury. And yet, it is a necessity. To achieve food security, we must do more than consider marine and water pollution as dangers to it. We must use our knowledge gained, and apply it to solutions. Tighter regulations, innovative and effective waste management, and lateral cooperation will not only bring us closer to zero hunger today, it will push the future, as well.

VIII. Questions to Consider

- How has your country's food security been impacted by marine and water pollution?
- To what extent can or will your country reduce marine and water pollution?
- What measures has your country taken to ensure food security despite marine and water pollution?
- What support does your country need to combat marine and water pollution?

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[46] United Nations Environment Programme (UNEP). 2021. *Food Security and Water Quality: Technical Highlights from the World Water Quality Alliance*. Nairobi: UNEP. https://www.unep.org/interactives/wwqa/technical-highlights/food-security-and-water-quality.

[47] United Nations Environment Programme (UNEP). 2021. *Food Security and Water Quality: Technical Highlights from the World Water Quality Alliance*. Nairobi: UNEP. https://www.unep.org/interactives/wwqa/technical-highlights/food-security-and-water-quality

[48] Tongesayi, Tinashe, and Shingirai Tongesayi. 2015. "Heavy Metals in Agricultural Soils from a Typical Industrial City in Zimbabwe: Implications for Food Security." In *Environmental and Food Safety and Security for South-East Europe and Ukraine*, edited by Ksenija Vitale, 219–236. Amsterdam: Elsevier. https://www.sciencedirect.com/science/article/abs/pii/B9780128002117000132.

- Which sectors (agriculture, industry, shipping) are the main contributors to pollution in your country's waters?
- Does your country, allies, or regional organizations profit with or from marine and water pollution?

IX. Sources for further research

United Nations Environment Programme. *Food Security and Water Quality: Technical Highlights from the World Water Quality Alliance*. UNEP, 2021, www.unep.org/interactives/wwqa/technical-highlights/food-security-and-water-quality. Accessed 20 Apr. 2025.

This United Nations Environment Programme assessment of water quality and its effects of food security explains clearly the different causes of bad water quality and their effects on food security. It is very helpful when researching the causes of water pollution, especially in agriculture.

World Bank. *What Is Food Security?* World Bank, 25 Mar. 2024, www.worldbank.org/en/topic/agriculture/brief/food-security-update/what-is-food-security. Accessed 4 Apr. 2025.

This page clearly defines food security and outlines the four key dimensions.

"Microplastics: Are we facing a new health crisis – and what can be done about it?" *The World Economic Forum*, 19 February 2025, https://www.weforum.org/stories/2025/02/how-microplastics-get-into-the-food-chain/. Accessed 20 April 2025.

This article by the World Economic Forum explains simply how and why microplastics get into our food chain, what the effects of that is, and what can be done against it.

"Marine Debris Disposal Options." *Marine Debris Program*, 19 March 2024, https://marinedebris.noaa.gov/fact-sheets/marine-debris-disposal-options. Accessed 21 April 2025.

This fact sheet from the United States National Oceanic and Atmospheric Administration's Marine Debris Program explains different marine debris disposal options.

"Water quality and food safety | Land & Water | Food and Agriculture Organization of the United Nations | Land & Water." *Food and Agriculture Organization of the United Nations*, https://www.fao.org/land-water/overview/onehealth/qualitysafety/en/. Accessed 20 April 2025.

This FAO article explains the connection between water quality and food security, with many examples.

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Alegbeleye, Oluwadara O., and Anderson S. Sant'ana. "Risks associated with the consumption of irrigation water contaminated produce: on the role of quantitative microbial risk assessment,." *Current Opinion in Food Science*, vol. 41, 2021, pp. 88-98. *ScienceDirect*, https://doi.org/10.1016/j.cofs.2021.03.013. Accessed 20 April 2025.

"Algal Blooms." *National Institute of Environmental Health Sciences*, https://www.niehs.nih.gov/health/topics/agents/algal-blooms. Accessed 20 April 2025.

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Attenborough, David. “How does plastic pollution affect marine life?” *Fauna & Flora*, https://www.fauna-flora.org/explained/how-does-plastic-pollution-affect-marine-life/. Accessed 20 April 2025.

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