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UNEP: Topic #1 - Waste Management

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How can sustainable waste management mitigate climate change and address global resource inequality?

Sustainable waste management includes the collection, treatment, and reuse of waste materials in ways that minimize environmental harm and maximize resource recovery. Around the world, high levels of waste threaten ecosystems, economies, and human health. From food waste in industrialized nations to untreated wastewater in developing regions; the global community is facing a dual crisis of inefficiency and environmental harm. The energy in untreated wastewater, five times more than what is used to process it, reflects a staggering loss of potential resources. Not only is food waste the largest contributor to municipal solid waste, everyday garbage produced by households, businesses, and institutions, but it also wastes the water, energy, and fertilizer required to manage it.<sup>1</sup> This issue directly relates to UNEP's Sustainable Development Goals, specifically SDG 12: Responsible Consumption and Production, and SDG 13: Climate Action.<sup>2</sup>

Food and water waste are among the leading drivers of pollution and resource depletion. Over one third of food produced in Western countries is never eaten, which also wastes the resources needed to produce it.<sup>3</sup> This inefficiency extends beyond food production. 89% of treated wastewater is being discarded without any resource recovery. Wastewater treatment

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<sup>1</sup> <https://www.unep.org/topics/ocean-seas-and-coasts/ecosystem-degradation-pollution/wastewater/wastewater-climate-action>

<sup>2</sup> <https://www.unep.org/frequently-asked-questions>

<sup>3</sup> <https://www.epa.gov/land-research/field-bin-environmental-impacts-us-food-waste-management-pathways>

processes contribute as much to global greenhouse gas emissions as the global aviation industry<sup>4</sup>, at an estimated 3.5 percent annually<sup>5</sup>. It is estimated that by 2050, approximately six billion people will face clean-water scarcity due to increasing demand from population growth and rising pollution levels<sup>6</sup>. Sustainable wastewater management can provide an alternative source of clean water, helping to reduce the strain on limited freshwater supply.

Additionally, as technology advances, new industries bring unexpected environmental costs. For example, the rapid growth of artificial intelligence has dramatically increased water consumption in data centers used to power generative AI systems. This growing demand for water intensifies the already critical global water shortage. Nearly two-thirds of the global population experiences severe water shortages for at least one month a year.<sup>7</sup> In addition, water deemed unsafe or substandard in developed countries often exceeds the quality of what is considered clean water in many developing nations.

There are many potential benefits to utilizing these untapped resources. Energy from wastewater can help to contribute to green energy requirements and climate mitigation. Wastewater has the potential to provide electricity for around half a billion people annually.<sup>8</sup> Recovering nutrients such as nitrogen, phosphorus, and potassium could offset approximately 13% of the global fertilizer demand in agriculture. However, these present higher treatment costs, creating inequality between developed and third-world countries.

To effectively address the impact of sustainable waste management on the environment, it is important to consider the following questions in your research.

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<sup>4</sup>[https://gridarendal-website-live.s3.amazonaws.com/production/documents/s\\_document/1061/original/Fact\\_Sheet\\_Wastewater\\_and\\_nutrient\\_for\\_ClimateAction.pdf?1702045393=](https://gridarendal-website-live.s3.amazonaws.com/production/documents/s_document/1061/original/Fact_Sheet_Wastewater_and_nutrient_for_ClimateAction.pdf?1702045393=)

<sup>5</sup> <https://research.noaa.gov/aviation-is-responsible-for-35-percent-of-climate-change-study-finds/>

<sup>6</sup> <https://wedocs.unep.org/handle/20.500.11822/41138>

<sup>7</sup><https://www.forbes.com/sites/cindygordon/2024/02/25/ai-is-accelerating-the-loss-of-our-scarcest-natural-resource-water/>

<sup>8</sup>[https://gridarendal-website-live.s3.amazonaws.com/production/documents/s\\_document/1061/original/Fact\\_Sheet\\_Wastewater\\_and\\_nutrient\\_for\\_ClimateAction.pdf?1702045393=](https://gridarendal-website-live.s3.amazonaws.com/production/documents/s_document/1061/original/Fact_Sheet_Wastewater_and_nutrient_for_ClimateAction.pdf?1702045393=)

- How does your country handle food waste domestically, and what policies exist for wastewater treatment and recycling?
- What technologies could help reduce food waste or recover energy from wastewater?
- Should governments prioritize reducing waste generation or improving recycling infrastructure?
- How might international corporations help address waste management in developing countries?
- Should developed countries be punished for wasting too much water and food? If so, how can this be monitored, and what's the threshold for being "too much"?
- Do the environmental benefits of energy and nutrient recovery outweigh the higher costs of wastewater treatment?

I encourage you to reach out with any questions or clarifications as you engage with this topic. The challenge of waste management is multifaceted, and requires both innovation and responsibility. I encourage you to explore how your nation can contribute to a cleaner, more sustainable world. Therefore it is essential to form an opinion based on research that aligns with your country's position on the matter. Be sure to engage with multiple perspectives, and remember to critically evaluate the sources of your information.

Lastly, please make sure that your research is unique and yours *only*. Make sure to properly cite all of your sources and offer your country's thoughts on the current debate over this topic. Remember that all papers will be submitted to Turnitin to check for plagiarism. Papers that are flagged for AI usage will not be eligible to win awards. If any questions come up, you should feel free to email me at [atik@mail.yu.edu](mailto:atik@mail.yu.edu).

Best of luck!

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