



NHSMUN

**UNEA**

**UPDATE PAPER**

**Secretary-General**  
**Terry Wang**

**Director-General**  
**Jordan Baker**

**Delegate Experience**  
**Nastasja Vásquez**  
**Ximena Faz**

**Global Partnerships**  
**Pierce Jau Hunter**  
**Natalia Carrillo**

**Under-Secretaries-  
General**

**Nachiketh Anand**  
**Alina Castillo**

**Seonghyun Chang**  
**Naina Dhawan**  
**Ximena Faz**

**Kellie Fernandez**  
**Grace Harb**  
**Adiva Ara Khan**  
**Anshul Magal**  
**Analucia Tello**  
**Sofia Velasco**  
**Renata Venzor**

Hello Delegates,

My name is Cristina Rivero, and I will be your Assistant Director for the first session of the United Nations Environment Assembly (UNEA) at NHSMUN 2025. I am excited to welcome you all to this committee alongside our chair, Ana Paula, and to delve into the critical issue of mitigating the impact of oil spills on biodiversity.

A little bit about me: I am 18 years old (and will be turning 19 during the conference—very excited to celebrate with you all!), from Lima, Peru. I have been a student at Villa Caritas since I was 12 (I graduated in 2023!). I have been involved in MUN for six years and have participated in numerous conferences.

I am passionate about Model UN and have participated in numerous conferences, representing various committees, including FAO, UNEA, UN Women, WHO, and the Security Council. Fun fact: in 2023, I was a delegate at NHSMUN, experiencing the conference from your perspective!

When I am not immersed in international relations, you can find me running (I have been a track and field athlete my whole life), reading (everything from novels to self-help books), or enjoying the beautiful beaches of Lima.

I understand that preparing for MUN conferences can be stressful and sometimes confusing. That is why I encourage you all to reach out to me with any questions or concerns you may have. I'm here to support you and ensure you have a rewarding experience at NHSMUN.

I hope this Update Paper provides you with a solid foundation for your research and helps you understand the complexities of this topic. I urge you to delve deeper into the issue, explore diverse perspectives, and come prepared to engage in fruitful debate and collaboration.

Best of luck with your preparations, and I look forward to meeting you all in March!

Sincerely,

Cristina Rivero

Assistant Director of United Nations Environment Assembly (UNEA)

Session I

[nhsmun.unea@imuna.org](mailto:nhsmun.unea@imuna.org)





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**Renata Venzor**

Dear Delegates,

Welcome to UNEA for NHSMUN 2025! My name is Camila Aguilar, and I am so excited to serve as your Assistant Director for Session II. Model UN has been a huge part of my life, and I am beyond grateful to be on the other side of NHSMUN and help students grow throughout their NHSMUN experience.

My journey in NHSMUN started in 2023 when I participated as a UNESCAP delegate representing the Singapore delegation. Meeting people from all around the world and discussing real-life issues made me realize how passionate I am about debating, public speaking, and being a true citizen of the world. That year I had the opportunity to deliver a speech for the closing ceremony in the UN Headquarters, one of my life's most memorable and exciting moments.

I then attended the NHSMUN 2024 conference as a delegate for UNTOC, serving as the captain of my delegation representing Mongolia. I was very sad to know that it would be my last time as a delegate; however, I was sure that I didn't want my NHSMUN journey to end there. This will be my first year being part of the NHSMUN staff, and although the experience is different, NHSMUN makes a huge impact on every person on the team.

I live in Mexico City and am currently in my freshman year of college, majoring in Global Management at Universidad Anahuac México. In the future, I would like to work in an organization focused on humanitarian help around the world. I love learning new things every day, and I aspire to be someone who can change the world for the better.

I am a huge bookworm and love reading any book that falls upon my hands. I also enjoy writing and hope to be the author of a novel one day. I love going out with my friends and spending time with my family, especially watching movies from the 80's and 90's with my mom. I also love to travel and get to know new places and cultures.

I truly hope that this NHSMUN experience can be as exciting and impactful for you as it is for me. Many do not realize the importance of knowing what goes on around the world, so I am very happy that you are one of the few who care about participating in this conference. In this document, you will find recent events regarding sustainable urban development in megacities and different perspectives on the topic. As the world advances, technology is even more important than ever and knowing that it offers tools and models that can help countries grow is very important for this topic. I hope that you find this information useful and that it helps you find new ways of addressing urban development.

Camila Aguilar

Assistant Director of United Nations Environment Assembly (UNEA)

Session II

[nhsmun.unea@imuna.org](mailto:nhsmun.unea@imuna.org)







UNEA

NHSMUN 2025

# TOPIC A: SUSTAINABLE URBAN DEVELOPMENT IN MEGACITIES

Photo Credit: Ming Chen



## Introduction

Today, 55 percent of the world's population lives in urban areas, a proportion that is expected to increase to 68 percent by 2050. Urbanization combined with the overall growth of the world's population could add 2.5 billion people to urban areas by 2050.<sup>1</sup> As cities grow larger, megacities face many challenges. These include environmental harm and struggling to meet people's needs.<sup>2</sup> Governments are working to solve these issues in different ways, like improving water systems and redesigning infrastructure. In today's world, technology plays a key role in finding solutions.<sup>3</sup>

To address the problems of megacities, solutions need to be varied and detailed. Different countries have their own needs. However, technology has helped tackle many issues at once.<sup>4</sup> For example, it can reduce the environmental damage caused by cities, expand public infrastructure, and more. With the advancement of technologies, governments can enhance the efficiency, quality of life, and sustainable development of megacities. For instance, governments can develop smarter transportation systems to handle traffic, improve infrastructures for energy efficiency, and advance communication systems.<sup>5</sup> But technology cannot fix everything on its own. It needs to be paired with good urban planning to create sustainable cities. The promotion of green buildings, inclusion of citizens, and encouragement of local economic growth must be at the forefront of every solution.

One major challenge for megacities is managing resources.<sup>6</sup> As populations grow, so do their needs. Governments often struggle to provide enough resources for everyone. Currently, there are 44 megacities, and by 2050, there may be 67.<sup>7</sup> It is estimated that by 2030 there will be 41 megacities with more than 10 million inhabitants. Moreover, the people in these cities will consume 81 percent of the world's resources and by 2050, these urban populations will need 50 percent more food

and 17 percent more water than they do today.<sup>8</sup> With the help of technology, governments can improve how they manage resources and plan.<sup>9</sup>

Technology is essential for urban growth. It affects daily life and the way megacities function. Building sustainable cities is crucial since they drive economic and cultural progress. As centers for economy, politics, and culture, megacities attract people from around the world and are constantly growing. However, they also face significant challenges in terms of sustainability, such as air pollution or scarce resources. Therefore, delegates as members of the UNEA must strive to strike a balance between economic growth, social justice, and environmental protection. The goal is to develop solutions where megacities can meet the needs of their residents without compromising the future generations. Meeting the needs of today's population also means protecting resources and opportunities for future generations.<sup>10</sup>

## The Role of Artificial Intelligence & Digital Twins

Urban resilience is a city's ability to prepare for and adapt to challenges. These challenges include natural disasters and

1 United Nations, "68% of the World Population Projected to Live in Urban Areas by 2050, Says UN," United Nations (United Nations), accessed February 10, 2025, <https://www.un.org/uk/desa/68-world-population-projected-live-urban-areas-2050-says-un>.

2 Jennifer Bansard, "Pathways to Sustainable Cities," International Institute for Sustainable Development, accessed February 11, 2025, [https://www.iisd.org/articles/deep-dive/pathways-sustainable-cities?gad\\_source=1&gclid=Cj0KCQiA4fi7BhC5ARIsAEV1YiYeckwB7NFHYcTCPsSeHj3uM68lwI20qiPHiV0pH35dY-nQgKWp9hAaApxxEALw\\_wcB](https://www.iisd.org/articles/deep-dive/pathways-sustainable-cities?gad_source=1&gclid=Cj0KCQiA4fi7BhC5ARIsAEV1YiYeckwB7NFHYcTCPsSeHj3uM68lwI20qiPHiV0pH35dY-nQgKWp9hAaApxxEALw_wcB).

3 Muktesh Mittal, "Technology for Planned Urbanization," The Smart City Journal, accessed February 10, 2025, <https://www.thesmartcityjournal.com/en/technology/technology-for-planned-urbanization>.

4 Mittal, "Technology for Planned Urbanization,"

5 Wilo Group, "Megacities: Dynamics, Realities & Sustainable Future | Wilo," wilo.com, June 20, 2024, [https://wilo.com/en/Pioneering/Stories/Understanding-Megacities-Dynamics-and-Realities-of-Urban-Centers-Worldwide\\_40512.html](https://wilo.com/en/Pioneering/Stories/Understanding-Megacities-Dynamics-and-Realities-of-Urban-Centers-Worldwide_40512.html).

6 Mittal, "Technology for Planned Urbanization,"

7 Saarah Ghazi, "Rise of New Megacities Will Drive Global Urban Growth," Oxford Economics, January 26, 2025, <https://www.oxfordeconomics.com/resource/rise-of-new-megacities-will-drive-global-urban-growth/>.

8 Rockwool, "The Sustainable Megacity," Rockwool.com, accessed February 11, 2025, <https://www.rockwool.com/group/about-us/our-thinking/urbanization/urbanization-defined/>.

9 Mittal, "Technology for Planned Urbanization,"

10 Wilo Group, "Megacities: Dynamics, Realities & Sustainable Future | Wilo,"



The digital twin of an oil rig

Credit: SumitAwinash

human-made events like industrial accidents or economic disruptions. Urban resilience helps protect people, adapt to change, and plan for risks.<sup>11</sup> Artificial Intelligence (AI) is a key tool in building this resilience and tackling urbanization challenges. AI is changing the world in many ways. It opens new fields in science, optimizes energy use, and improves public health and farming. AI can also predict and address pandemics, floods, wildfires, and food shortages.<sup>12</sup> These efforts contribute to the achievement of Sustainable Development Goals.

AI is a powerful and relatively new technology. It helps governments predict problems and create solutions for issues like traffic and energy use.<sup>13</sup> Adding AI to city planning and management can address everyday problems in megacities. For example, traffic congestion causes 61 percent of global CO<sub>2</sub> emissions.<sup>14</sup> This pollution harms public health and

the environment. With AI, governments can analyze traffic patterns, predict congestion, and optimize traffic light timings. AI also improves how resources are managed and distributed. Tehran, Iran, provides a good example of AI in urban management. It is the most populated city in Western Asia, with 9.6 million people in 2024.<sup>15</sup> Tehran uses AI to address its risks, including earthquakes and floods. AI provides early warnings for natural disasters, helping the city prepare. Other uses include communication systems, urban planning, and resource management. Tehran follows a four-step plan: assessing risks, collecting data, creating strategies, and evaluating results.<sup>16</sup> This plan also involves mapping, training, and creating environmental policies. In France, cities use AI to model scenarios, assess infrastructure, and plan land use.<sup>17</sup> AI simulates traffic to help reduce congestion and improve mobility.<sup>18</sup> Moreover, France is developing a project

11 Resilient Cities Network, "What Is Urban Resilience? - Resilient Cities Network," [resilientcitiesnetwork.org](https://resilientcitiesnetwork.org/what-is-urban-resilience/), accessed February 10, 2025, <https://resilientcitiesnetwork.org/what-is-urban-resilience/>.

12 United Nations, "Governing AI for Humanity," September 2024, [https://www.un.org/sites/un2.un.org/files/governing\\_ai\\_for\\_humanity\\_final\\_report\\_en.pdf](https://www.un.org/sites/un2.un.org/files/governing_ai_for_humanity_final_report_en.pdf).

13 Seyed Reza Samaei, "Using Artificial Intelligence to Increase Urban Resilience: A Case Study of Tehran," 13th International Conference on Advanced Research in Science, Engineering and Technology, January 17, 2024, [https://www.researchgate.net/publication/377443501\\_Using\\_Artificial\\_Intelligence\\_to\\_Increase\\_Urban\\_Resilience\\_A\\_Case\\_Study\\_of\\_Tehran](https://www.researchgate.net/publication/377443501_Using_Artificial_Intelligence_to_Increase_Urban_Resilience_A_Case_Study_of_Tehran).

14 European Parliament, "CO<sub>2</sub> Emissions from Cars: Facts and Figures (Infographics) | Topics | European Parliament," European Parliament, accessed February 10, 2025, <https://www.europarl.europa.eu/topics/en/article/20190313STO31218/co2-emissions-from-cars-facts-and-figures-infographics>.

15 MacroTrends, "Tehran, Iran Metro Area Population 1950-2024," [www.macrotrends.net](http://www.macrotrends.net), accessed February 10, 2025, <https://www.macrotrends.net/global-metrics/cities/21523/tehran/population>.

16 Samaei, "Using Artificial Intelligence to Increase Urban Resilience: A Case Study of Tehran."

17 Rachid Ejjami, "AI-Driven Smart Cities in France," *International Journal for Multidisciplinary Research* 6, no. 3 (June 2, 2024), <https://doi.org/10.36948/ijfmr.2024.v06i03.21920>.

18 Ejjami, "AI-Driven Smart Cities in France,"

where through AI, cameras can detect traffic offences such as using a phone while driving or not wearing a seat belt. The new government's budget is being debated in parliament. It comes as part of a broader plan to modernise France's 4,000 traffic cameras at a proposed cost of EUR 46 million.<sup>19</sup> Some of the most advanced cameras can even count the number of passengers to check that drivers are not misusing lanes reserved for car-sharing.

Another advanced tool is digital twins (DTs). Digital twins are virtual models of cities. They predict environmental impacts and help solve problems before they arise.<sup>20</sup> This approach improves sustainability by saving resources.<sup>21</sup> A major example is Destination Earth (DestinE), launched by the European Commission in 2022.<sup>22</sup> DestinE creates digital models of Earth to study climate change, extreme weather, and adaptation strategies. It monitors Earth's systems, predicts environmental disasters, and tests sustainable development plans.<sup>23</sup> Traditional strategies for solving urban problems have been useful but often lack flexibility. They struggle to keep up with the fast changes in cities and the impacts of climate change.<sup>24</sup> This is why digital twins (DTs) are so important. DTs create a digital copy of a system, reflecting its physical features and behaviors. This allows for real-time monitoring, analysis, and simulation. It helps find long-term, sustainable solutions to issues like the urban heat island (UHI) effect.<sup>25</sup> For instance, Spain's Predictia developed a climate emulator to improve DestinE's capabilities using AI and machine learning.<sup>26</sup> AI and digital twins are powerful tools for managing cities. They make urban areas more sustainable, efficient and prepared for the future.

One of the main challenges megacities face is the urban heat

island effect (UHI). "An urban heat island is an urban area much warmer than the rural areas surrounding it."<sup>27</sup> Heat is created by energy from all the people, cars, buses, and trains in big cities.<sup>28</sup> This effect leads to more problems, such as bad air and water quality, and it has proven to be a major contributor to global warming. Despite the multiple approaches that have been attempted to solve this issue, UHI has not yet been mitigated. However, digital twins offer a promising new approach to address the problem of UHI. Digital twins are also important in urban construction. They use data to solve problems like sustainability and infrastructure planning.<sup>29</sup> By simulating city scenarios, DTs help predict traffic jams and structural wear. They also improve how resources are used and encourage public participation in city planning. In Ithaca, there is ongoing planning to electrify its entire building stock to significantly reduce carbon dioxide emissions from the building sector and reach city-wide carbon neutrality by 2030.<sup>30</sup> Through digital twins they have strategically identified properties for electrification, facilitating outreach and allocation of limited municipal funds and resources.

Technology is a very powerful tool when used correctly. To make megacities sustainable it is important to consider comprehensive and tailored approaches. Sustainable technologies and urban planning concepts should be integrated to enable an environmentally friendly and urban life. AI and digital twins can make megacities more resilient, sustainable, and efficient. Through these technologies, megacities can address a wide range of challenges, from traffic congestion and environmental pollution to natural disasters and climate change, creating a more livable and sustainable future for all.

19 RFI, "France Bets on AI-Powered Traffic Cameras to Catch Drivers Who Break Rules," RFI, November 2, 2024, <https://www.rfi.fr/en/france/20241102-france-bets-on-ai-powered-traffic-cameras-to-catch-drivers-who-break-rules>.

20 Hossein Omrany and Karam M. Al-Obaidi, "Application of Digital Twin Technology for Urban Heat Island Mitigation: Review and Conceptual Framework," *Smart and Sustainable Built Environment*, October 2, 2024, <https://doi.org/10.1108/sasbe-05-2024-0189>.

21 Omrany and Al-Obaidi, "Application of digital twin technology for Urban Heat Island mitigation: review and conceptual framework."

22 Destination Earth, "About Destination Earth - Destination Earth," Destination Earth, June 10, 2024, <https://destination-earth.eu/destination-earth/>.

23 Omrany and Al-Obaidi, "Application of digital twin technology for Urban Heat Island mitigation: review and conceptual framework."

24 Omrany and Al-Obaidi, "Application of digital twin technology for Urban Heat Island mitigation: review and conceptual framework."

25 Omrany and Al-Obaidi, "Application of digital twin technology for Urban Heat Island mitigation: review and conceptual framework."

26 Destination Earth, "About Destination Earth - Destination Earth,"

27 National Geographic, "Urban Heat Island," [education.nationalgeographic.org](https://education.nationalgeographic.org/resource/urban-heat-island/), accessed February 10, 2025, <https://education.nationalgeographic.org/resource/urban-heat-island/>.

28 National Geographic, "Urban Heat Island,"

29 Dechen Peldon et al., "Navigating Urban Complexity: The Transformative Role of Digital Twins in Smart City Development," *Sustainable Cities and Society* 111 (September 1, 2024): 105583–83, <https://doi.org/10.1016/j.scs.2024.105583>.

30 Peldon et al., "Navigating Urban Complexity: The Transformative Role of Digital Twins in Smart City Development,"



## Circular Economy Models & Smart Agriculture

A circular economy keeps materials in use and reduces waste. It also helps restore nature. In this system, products are reused, recycled, or composted.<sup>31</sup> This approach can help solve pollution and resource shortages in megacities. As populations grow, cities struggle to meet people's needs. A circular economy helps by extending the life of materials and reducing waste.<sup>32</sup>

Many global organizations support the shift to circular economies. This change reduces the environmental impact of cities, especially in developing countries. Growing populations increase the demand for resources, making better management essential.<sup>33</sup> In 2022, the United Nations Environment Assembly (UNEA) passed resolutions promoting circular

31 Ellen MacArthur Foundation, "Circular Economy Introduction," Ellen MacArthur Foundation, accessed February 10, 2025, <https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>.

32 Ellen MacArthur Foundation, "Circular Economy Introduction,"

33 United Nations Environment Program, "UN Environment Assembly 5 (UNEA 5.2) Resolutions," UNEP - UN Environment Programme, accessed February 10, 2025, <https://www.unep.org/resources/resolutions-treaties-and-decisions/UN-Environment-Assembly-5-2>.

34 United Nations Environment Program. Resolution EA.5/Res.11. Enhancing Circular Economy as a Contribution to Achieving Sustainable Consumption and Production. UNEP/EA.5/Res.11. March 2, 2022. <https://wedocs.unep.org/bitstream/handle/20.500.11822/39920/ENHANCING%20CIRCULAR%20ECONOMY%20AS%20A%20CONTRIBUTION%20TO%20ACHIEVING%20SUSTAINABLE%20CONSUMPTION%20AND%20PRODUCTION.%20English.pdf?sequence=1&isAllowed=y>

35 UNEP/EA.5/Res.11.

36 United Nations Department of Economic and Social Affairs, "Implementation of the German National Water Strategy (NWS) | Department of Economic and Social Affairs," Un.org, accessed February 11, 2025, <https://sdgs.un.org/partnerships/implementation-german-national-water-strategy-nws>.

37 United Nations Department of Economic and Social Affairs, "Implementation of the German National Water Strategy (NWS) | Department of Economic and Social Affairs,"

models.<sup>34</sup> These include sustainable infrastructure, lake management, and plastic pollution control. Countries like Costa Rica, Finland, Germany, and Sweden are already using these models.<sup>35</sup>

The German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) developed the first National Water Strategy (NWS), which was adopted by the Federal Cabinet on 15 March 2023.<sup>36</sup> The NWS addresses the challenges of the water sector in Germany up to the year 2050. It describes ten strategic areas and sets a vision and aspired goals to address them over the coming 30 years. Through the NWS, stakeholders contribute to the restoration of the natural water balance and climate resilience of the water sector in the near- and long-term future.<sup>37</sup>



Climate-smart agriculture in Machakos, Kenya

Credit: Climate Change, Agriculture and Food Security



Circular economies also have strong links to agriculture. These models reduce waste, keep materials in use, and regenerate natural resources.<sup>38</sup> They also encourage the use of smart agriculture. This type of farming relies on advanced technology to improve production and sustainability. Smart agriculture helps reduce greenhouse gas emissions, boost resilience, and adapt to climate change.<sup>39</sup> Smart agriculture uses technology to boost productivity, enhance resilience, and reduce greenhouse gas emissions (GHG). Although its base is traditional agriculture, it mainly differs by having a strong focus on addressing climate change in the agrifood system. It incorporates technologies made specifically to treat climate-resilient crops, precision farming, and improved livestock management.<sup>40</sup> These characteristics make smart agriculture crucial for the sustainable development of megacities to reduce their environmental footprint.

Today, the global agrifood system emits one-third of all emissions. “Global food demand is estimated to increase to feed a projected global population of 9.7 billion people by 2050.”<sup>41</sup> Food systems are the leading source of methane emissions and biodiversity loss, and they use around 70 percent of freshwater. Agriculture is also the primary cause of deforestation, threatening ecosystems such as the Amazon and the Congo Basin. Without action, emissions from food systems will rise even further, with increasing food production. A smart agriculture system, linked with circular economy models, must be adopted to promote food security and sustainable development while addressing the issue of climate change.<sup>42</sup> Delegates are encouraged to promote these topics in their resolutions if they are legally binding and amenable to their government structures.

Many countries have started to adopt this system. In Lima, Peru, water management is one of the most relevant topics.<sup>43</sup> Therefore, it has started the implementation of wastewater treatment plants (WWTPs). Currently, 90 percent of Lima’s water is treated to improve its quality in a sustainable, circular way.<sup>44</sup> Other cities such as Shanghai, China, and Mumbai, India, have implemented plastic pollution control programs with the help of circular economy models.<sup>45</sup> The circular economy is one of the key negotiation aspects of the UN plastic treaty. Recycling could be a crucial way for emerging economies to achieve the target of plastic pollution control and better management systems.<sup>46</sup>

The link between the circular economy and agriculture is very strong. When they work together, they can transform megacities and their environmental footprint. This fusion has also led to the birth of organizations such as the Naandi Foundation in India, an organization that continuously promotes sustainable farming practices through different projects around the country.<sup>47</sup> Some of these projects include organic composting, agroforestry, rainwater harvesting, and zero-waste farming. This has improved livelihoods and has had various environmental benefits. Most importantly, these sustainable farming methods have created huge community empowerment and have provided communities with the necessary training and resources to continue with these practices.<sup>48</sup>

Smart agriculture is also expanding. By 2024, the global market is expected to reach USD 14.4 billion and grow to USD 23.38 billion by 2029.<sup>49</sup> New technologies enable predictive analysis, automated farming, and climate adaptation. These advances

38 Tabssum Hassan, “Circular Economy in Farming,” AgriNext Conference, October 12, 2024, <https://agrinextcon.com/circular-economy-in-farming-a-sustainable-approach/>.

39 World Bank Group, “Climate-Smart Agriculture,” World Bank, 2024, <https://www.worldbank.org/en/topic/climate-smart-agriculture>.

40 World Bank Group, “Climate-Smart Agriculture,”

41 World Bank Group, “Climate-Smart Agriculture.”

42 World Bank Group, “Climate-Smart Agriculture.”

43 Andre Torre et al., “A Multi-Criteria Decision Framework for Circular Wastewater Systems in Emerging Megacities of the Global South,” *Science of the Total Environment* 912 (February 1, 2024): 169085–85, <https://doi.org/10.1016/j.scitotenv.2023.169085>.

44 Torre et al., “A Multi-Criteria Decision Framework for Circular Wastewater Systems in Emerging Megacities of the Global South,”

45 Qian Jia et al., “What Determines Plastic Recycling Intention and Behavior of Consumers in Megacities of Emerging Economies? Evidence from Shanghai, China and Mumbai, India,” *Journal of Cleaner Production*, July 1, 2024, 143219–19, <https://doi.org/10.1016/j.jclepro.2024.143219>.

46 Jia et al., “What Determines Plastic Recycling Intention and Behavior of Consumers in Megacities of Emerging Economies? Evidence from Shanghai, China and Mumbai, India,”

47 Hassan, “Circular Economy in Farming,”

48 Hassan, “Circular Economy in Farming,”

49 MarketsandMarkets, “Smart Agriculture Market Size, Share and Trends,” December 2024, <https://www.marketsandmarkets.com/Market-Reports/smart-agriculture-market-239736790.html>.



make agriculture more efficient and eco-friendlier.<sup>50</sup>

Megacities can benefit greatly from circular economies. Resources from urbanization, such as old infrastructure, can be reused for housing or transportation.<sup>51</sup> Materials can also be recycled back into the economy.<sup>52</sup> Governments must consider circular economy models to reduce waste production and enhance sustainable farming practices. This will transform their urbanization processes through eco-friendly, zero-waste models.

## Conclusion

Tackling the challenges of growing megacities needs a flexible and modern approach. As the world becomes more globalized, it is necessary that countries collaborate and build solutions that can benefit everyone. This includes using AI to predict risks and shifting to circular economy models for better resource use. Many countries have adopted these systems, showing their positive impact on urban development.

As the pace of urban growth quickens and urban populations expand, it becomes vital to develop effective urban policies. Using technology in daily planning helps governments reduce the environmental footprint of megacities. These strategies can create smarter and greener cities for future generations. While technology can solve many issues in megacities, this is just the beginning. The exchange of ideas among countries can enable urban centers worldwide to gain valuable insights into sustainable development practices. Ultimately, collaboration fosters hope that together, governments, companies, communities, and individuals can construct cities that are not only environmentally friendly and resilient but also equitable for all.<sup>53</sup>

AI, digital twins, smart agriculture, and circular economy models all help make cities more sustainable. Nevertheless, there are still challenges in urban planning that need attention. Governments should keep researching to find practical, legally

binding solutions for their specific needs. Building sustainable megacities is vital for our planet and the people living in urban areas. These cities drive economic growth, innovation, and culture. However, they also use a lot of resources and harm the environment. If actions are not taken, issues like climate change, resource shortages, and social inequalities will worsen.

Focusing on sustainable urban development can bring cleaner air, better health, and smarter resource use. It can also improve life for millions of people. The choices taken now will shape if cities stay livable for future generations. Now is the time to act, create, and invest in solutions that protect our environment while supporting growth.

<sup>50</sup> MarketsandMarkets, "Smart Agriculture Market Size, Share and Trends,"

<sup>51</sup> Srinivasa Raghavendra Bhuvan Gummidi et al., "Developing an Urban Resource Cadaster for Circular Economy," Sustainable Development Goals Series, January 1, 2024, 83–95, [https://doi.org/10.1007/978-3-031-56241-9\\_6](https://doi.org/10.1007/978-3-031-56241-9_6).

<sup>52</sup> Gummidi et al., "Developing an Urban Resource Cadaster for Circular Economy,"

<sup>53</sup> ICLEI Network, "City of Tomorrow: How Megacities Are Pioneering Sustainable Development Solutions," Iclei.org, June 21, 2024, <https://talkofthecities.iclei.org/city-of-tomorrow-how-megacities-are-pioneering-sustainable-development-solutions/>.





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# TOPIC B: IMPACTS OF THE OIL INDUSTRY ON BIODIVERSITY

Photo Credit: GuavaTrain



## Introduction

Oil industry is a serious threat to global biodiversity. It risks ecosystems and speeds up climate change. The Global Risk Report of 2024 estimated that biodiversity loss and ecosystem collapse is going to be the third most critical risk by 2034.<sup>1</sup> In the last 50 years it was reported a decline of 73 percent in wildlife populations.<sup>2</sup> Overexploitation of environments, like oil and gas exploration, is the second direct cause of biodiversity loss.<sup>3</sup> Extracting oil and gas can cause disruption of migratory pathways and degradation of animal habitats.<sup>4</sup> Oil spills pollute water, destroy ecosystems like wetlands and coral reefs, and add to greenhouse gas emissions.<sup>5</sup> These environmental accidents can lead to massive disasters for the local habitat. They are also very deadly for all types of wildlife from animals to fish in the sea. The toxins released by oil spills devastate environments and take decades to clean up. Oil spills also release methane, a greenhouse gas. Methane can heat the planet 80 times more than carbon dioxide over 20 years.<sup>6</sup> The release of methane worsens global warming, accelerating rising sea levels, extreme weather events, and biodiversity loss.<sup>7</sup> All of these point towards the importance of making sure that the oil industry does not negatively impact the environment.

Today's countries face the challenge of powering their fossil-based economies while protecting biodiversity and countering its climatic effects. Oil industry not only generates jobs and foreign trade, but also allows countries to supply and meet power. Oil industry is a major player in the global economy. It is estimated that the sector accounts for almost 4 percent of the global economy.<sup>8</sup> For many developing countries, oil is still a major source of energy and fuel. Many power plants burn diesel which is an oil-derived product. Fuel alternatives to oil tend to be expensive and converting oil power plants to more renewable energy sources take time. As a part of the United Nations Environment Assembly (UNEA), delegates must come up with innovative solutions. Biodiversity must be protected but it cannot compromise the economy of countries. However, action must be taken immediately before reaching a point of no return.

## Technological Developments and their Gaps in Implementation

Technology can be used to protect the environment. With the help of technology oil spills are being prevented and decreasing numbers of the last decades. Following the major tragedies of oil spills, it was understood that the importance needs to be focused on preventing accidents. Technology is helping the detection and cleaning up of oil spills. However, there are still important gaps that make it harder to fully use these solutions. Closing these gaps is essential to improving how the world responds to oil spills. Researchers from the University of Antwerp in Belgium aim to prevent and speed cleaning operations of oil spills with drone images.<sup>9</sup> The team focuses on computer vision and environmental monitoring. Their dataset contains 1,268 labeled images which they

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3 The Royal Society, "What Is the Human Impact on Biodiversity?," [royalsociety.org](https://royalsociety.org/news-resources/projects/biodiversity/human-impact-on-biodiversity/), 2024, <https://royalsociety.org/news-resources/projects/biodiversity/human-impact-on-biodiversity/>.

4 World Wildlife Fund, "Oil and Gas Development," World Wildlife Fund, accessed February 10, 2025, <https://www.worldwildlife.org/threats/oil-and-gas-development>.

5 Eden Green, "The Most Significant Environmental Problems of 2025," Eden Green, December 31, 2024, <https://www.edengreen.com/blog-collection/environmental-problems>.

6 Hiroko Tabuchi, "Oil Fields Release Far More Methane than Thought, Study Finds," The New York Times, March 13, 2024, sec. Climate, <https://www.nytimes.com/2024/03/13/climate/oil-gas-industry-methane-release.html>.

7 Tabuchi, "Oil Fields Release Far More Methane Than Thought, Study Finds."

8 Keyur Bhalavat, "Top Oil & Gas Industry Challenges in 2024 and How to Solve Them - Plutomen," Plutomen, August 23, 2024, <https://pluto-men.com/top-oil-gas-industry-challenges-solve/>.

9 Thomas De Kerf et al., "A Dataset of Drone-Captured, Segmented Images for Oil Spill Detection in Port Environments," Scientific Data 11, no. 1 (October 30, 2024), <https://doi.org/10.1038/s41597-024-03993-8>.



Drone Applications Specific to Oil and Gas Companies

Credit: ZenaTech

use to train the model to detect oil spills in real scenarios.<sup>10</sup> Perfecting the program helps detect spills faster and more efficiently. A faster cleanup means less environmental damage.

A major challenge is making this technology accessible to all. Many developing countries lack the money and skills to use and maintain drone systems. This creates a gap where wealthier countries handle oil spills better. Meanwhile, poorer countries remain more at risk.<sup>11</sup> In 2023, the Office of Response and Restoration (OR&R) in joint effort with the Coast Guard started a project to optimize oil response with drones.<sup>12</sup> They want drones to map and identify the situation, so that on-the-ground responders would have a better understanding and management of the spill.<sup>13</sup> The drones also identify future oil spills and estimate how long the oil will stay in the environment after the incidents.<sup>14</sup> The drones

were successfully tested during multiple oil spills in 2024, such as the oil spill on Lake Hatch and Baltimore after the bridge collapse.<sup>15</sup> On the other hand, Peru struggled to manage an oil spill on their coast and declared an environmental emergency in December 2024.<sup>16</sup> Oil company Petroperu spilled a crude oil shipment into surrounding waters of the Pacific Ocean on December 21, 2024.<sup>17</sup> Without the proper technology, the company and the government failed to give exact reports on the situation. OEFA, an environmental NGO, estimated that 10,000 square meters of surface seawater and 7 beaches were affected.<sup>18</sup> Similarly, Canada has launched the Oil Spill Response Challenge with USD 10 million in funding.<sup>19</sup> The goal is to develop better ways to detect and clean up oil spills in water. This project aims to address Canada's diverse aquatic environments, like its long coastlines or the Arctic conditions,

<sup>10</sup> De Kerf et al., "A Dataset of Drone-Captured, Segmented Images for Oil Spill Detection in Port Environments,"

<sup>11</sup> World Bank Group, "Fostering Rwanda Competitiveness and Resilience in the Post-COVID-19 Era," Worldbank.org, 2025, <https://openknowledge.worldbank.org/entities/publication/08bcccdf-2e15-5648-8159-559153f9e273><https://openknowledge.worldbank.org/entities/publication/08bcccdf-2e15-5648-8159-559153f9e273>

<sup>12</sup> Melanie Herrera, "It All Begins with a Flight: Operationalizing Uncrewed Aircrafts to Support Oil Spill Response, Recovery and Restoration," [blog.response.restoration.noaa.gov](https://blog.response.restoration.noaa.gov), January 23, 2024, <https://blog.response.restoration.noaa.gov/it-all-begins-flight-operationalizing-uncrewed-aircrafts-support-oil-spill-response-recovery-and->

<sup>13</sup> Herrera, "It All Begins with a Flight: Operationalizing Uncrewed Aircrafts to Support Oil Spill Response, Recovery and Restoration,"

<sup>14</sup> NOAA Office of Response and Restoration, "Incident Responses for March 2024," [blog.response.restoration.noaa.gov](https://blog.response.restoration.noaa.gov), May 2, 2024, <https://blog.response.restoration.noaa.gov/incident-responses-march-2024>.

<sup>15</sup> NOAA Office of Response and Restoration, "Incident Responses for March 2024,"

<sup>16</sup> Reuters Staff, "Peru Declares Environmental Emergency after Oil Spill," Reuters, December 27, 2024, <https://www.reuters.com/business/environment/peru-declares-environmental-emergency-after-oil-spill-2024-12-26/>.

<sup>17</sup> Reuters Staff, "Peru Declares Environmental Emergency after Oil Spill,"

<sup>18</sup> Reuters Staff, "Peru Declares Environmental Emergency after Oil Spill,"

<sup>19</sup> Natural Resources Canada, "Impact Canada: Oil Spill Response Challenge," [natural-resources.canada.ca](https://natural-resources.canada.ca/science-and-data/funding-partnerships/opportunities/grants-incentives/impact-canada-oil-spill-response-challenge/24681), accessed February 10, 2025, <https://natural-resources.canada.ca/science-and-data/funding-partnerships/opportunities/grants-incentives/impact-canada-oil-spill-response-challenge/24681>.



and have a contingency plan in case of a spill in each of these scenarios.<sup>20</sup> It aims to reduce the damage caused by oil spills through improved detection and recovery. The challenge has funded several projects. For example, Aqua-Guard Spill Response Inc. is creating a highly efficient oil skimming system. Dalhousie University is working on robotic vehicles that quickly detect and respond to spills.<sup>21</sup> These projects highlight Canada's commitment to finding new solutions and working together to fight oil spills.

At the same time, researchers from the University of Waterloo, in Canada, have created a new material for cleaning oil spills — a tri-block copolymer.<sup>22</sup> This is a type of polymer made up of three distinct blocks with different properties, allowing it to absorb oil up to eight times its weight.<sup>23</sup> When the material comes into contact with oil, it turns into a gel, forming a barrier that traps the oil and prevents it from spreading further. This breakthrough addresses a major flaw in current oil absorbents, which often leak oil back into the environment once they become too saturated.<sup>24</sup> Meanwhile, scientists at the University of Waterloo have developed a promising new material for cleaning up spills.<sup>25</sup> A special polymer with three unique parts, a tri-block copolymer.<sup>26</sup> This design allows it to soak up oil up to eight times its weight. Once it touches oil, it turns into a gel, creating a barrier that stops the spill from spreading.<sup>27</sup> This Canadian innovation shows promise for controlling spills and protecting groundwater. However, more testing and development are needed.<sup>28</sup> Large-scale production and field tests are key to ensuring it works in different conditions. Public-private partnerships (PPPs) can help speed up commercialization. These partnerships combine government oversight with private sector innovation,

efficiency, and funding.<sup>29</sup> In oil spill response, PPPs can connect researchers, technology developers, and oil companies. This collaboration can lead to faster development and use of new solutions.<sup>30</sup> PPPs can also fund research into environmentally valuable technologies that are not yet profitable. They can make these technologies available to developing countries through technology transfer, training, and joint projects. While developed countries like Canada make progress, similar efforts are needed in developing states. Many face financial and technical hurdles in using drone technology for oil spills. UNEA delegates should focus on programs that support technology sharing, training, and funding. This will help developing countries adopt drone systems for spill detection and cleanup.

Artificial intelligence (AI) is quickly changing how oil spills are managed. AI is changing how we prevent, detect, and respond to oil spills.<sup>31</sup> It can predict where spills will go, helping experts focus clean-up efforts. AI also analyzes satellite and drone images to find spills that humans might miss, even in tough conditions. Companies like Kongsberg Satellite Services (KSAT) use AI to study radar data, detecting thousands of possible spills.<sup>32</sup> Repsol's ARIEL project uses AI-powered drones to spot oil in the sea. Researchers at the German Aerospace Center (DLR) are also working on AI systems to detect spills using satellite data.<sup>33</sup> These advances show AI's growing role in protecting the environment. Despite progress, big challenges remain. Weak policies, limited funding, and poor cooperation slow things down. Delegates must push for policies that support innovation while making sure oil companies use modern spill-prevention tools and ensuring accessibility to all countries. Accountability and action are key

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22 University of Waterloo News, "New Material Aims to Transform Oil Spill Cleanup | Waterloo News," Waterloo News, September 3, 2024, <https://uwaterloo.ca/news/new-material-aims-transform-oil-spill-cleanup>.

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28 International Finance Corporation, "Public-Private Partnerships," accessed December 27, 2024, <https://www.ifc.org/en/what-we-do/sector-expertise/public-private-partnerships>.

29 International Finance Corporation, "Public-Private Partnerships,"

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31 Mayuly Rodríguez, "Oil Algorithms: Improving Oil Spill Detection with Artificial Intelligence," Inspecnet, June 14, 2023, <https://inspenet.com/en/articulo/oil-algorithms-improving-oil-spill-detection-with-artificial-intelligence/>.

32 Rodríguez, "Oil Algorithms: Improving Oil Spill Detection with Artificial Intelligence."

33 Rodríguez, "Oil Algorithms: Improving Oil Spill Detection with Artificial Intelligence."

to real change.

## Case Study: Oil Spills in South America

Latin America holds the world's second largest hydrocarbon reserves.<sup>34</sup> Hydrocarbon reserves are the deposits of oil and gas, the primary sources of energy for the world's economy.<sup>35</sup> The production in the region had seen a steady decline due to the region's political instability, like in countries such as Venezuela and Mexico. However, from 2022 the oil and gas production has increased significantly.<sup>36</sup> For example in Guayana, an offshore oil was discovered in 2015. By 2024 the production reached 600,000 barrels of oil per day.<sup>37</sup> This production surge represents an increase in the region's economy and in energy security. However, it also presents a significant increase in carbon emissions and a higher risk of oil spills. This has impacted the biodiversity throughout the region.

For instance, Brazil has a long history of oil spills. Since the 1960s, the Brazilian biodiversity has suffered the impact of an oil spill.<sup>38</sup> In recent years, this situation has gotten worse. The country's expansion of oil exploration through the shore has raised several environmental concerns. The expansion increases the risks of an oil spill and of damaging the marine and coastal ecosystems. While the last oil spill was in 2023, the country is still facing the effects. The flora and fauna are still facing consequences from the direct exposure to oil. This includes seabirds, fish and other wildlife. Moreover, the oil

spills have consequences on the economy. In an oil spill, fishing grounds are contaminated which affects the livelihood of the fishing communities and their economies.<sup>39</sup> Additionally, the beaches are also contaminated. This causes a decline in tourism-related activities. This harms several businesses, including hotels, restaurants, and recreational services that depend on tourism.<sup>40</sup> However, the long-term effects are less evident. In fact, some consequences can even take a few years to be detected.

The long-term effects of oil spills can be detrimental to the environment. The oil accumulates and it travels through food webs, such as zooplankton. Zooplankton are small organisms that obtain nutrients by feeding on other organisms. They are the primary energy pathway between primary producers and small organisms to larger predators and fish.<sup>41</sup> In an oil spill the zooplankton is poisoned, harming the entire ecosystem that depends on it. The oil also accumulates on plant surfaces which affect the surrounding flora and fauna.<sup>42</sup> As a result, they contaminate the area for decades.<sup>43</sup> The oil pollution in the years to come destroys the ecosystem.<sup>44</sup> This leads to a loss of biodiversity, affecting both plants and animals. Particularly, marine life is highly susceptible to the effects of oil spills. Additionally, the continuous presence of oil in an ecosystem leads to ongoing deaths and reduces species abilities to diverse.<sup>45</sup> Therefore, in the long term an oil spill can destroy an ecosystem, killing its flora and fauna.

The long-term impacts of oil spills can be seen with the impacts that are just surfacing from an oil spill in 2019. The spill lasted from August 2019 until March 2020. It affected over

34 Francisco J. Monaldi, "Latin America's Hydrocarbon Production Is Key to Global Energy Security," Baker Institute, October 29, 2024, <https://www.bakerinstitute.org/research/latin-americas-hydrocarbon-production-key-global-energy-security>.

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36 Monaldi, "Latin America's Hydrocarbon Production Is Key to Global Energy Security,"

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38 Daniel Constantino Zacharias et al., "Offshore Oil Spills in Brazil: An Extensive Review and Further Development," *Marine Pollution Bulletin* 205 (August 1, 2024): 116663–63, <https://doi.org/10.1016/j.marpolbul.2024.116663>.

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40 Zacharias et al., "Offshore Oil Spills in Brazil: An Extensive Review and Further Development,"

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42 Komal Sharma et al., "Comprehensive Insights into the Impact of Oil Pollution on the Environment," *Regional Studies in Marine Science* 74 (April 1, 2024): 103516–16, <https://doi.org/10.1016/j.rsma.2024.103516>.

43 Zacharias et al., "Offshore Oil Spills in Brazil: An Extensive Review and Further Development,"

44 Sharma et al., "Comprehensive Insights into the Impact of Oil Pollution on the Environment,"

45 Sharma et al., "Comprehensive Insights into the Impact of Oil Pollution on the Environment,"



3,000 square kilometers. Even five years after the oil spill that affected 11 coastal states, Brazil is still facing its impact.<sup>46</sup> The consequences are specially faced by fishermen and workers that depend on marine life. Yet, after the spill some species of fish disappeared, and shellfish decreased. Additionally, many people in the local communities faced health problems because of the oil. Many are facing skin problems, and some people are even becoming blind. Also, due the separation because to the lack of income some people have committed suicide. Currently, the people affected are demanding justice through the campaign “Sea of Struggle”.<sup>47</sup> Said campaign aims to seek compensation for the population affected by the spill. Hence, the oil spill in Brazil, not only affects the flora and fauna, but years later they affect the quality of life of the people living near the affected areas. Another example is the case of Peru. Peru is home to the second-largest area of the Amazon rainforest after Brazil and has more than 12,000 species.<sup>48</sup> The Amazon rainforest is vital for the planet. It regulates the global

climate, holds 10 percent of known biodiversity, and provides essential services.<sup>49</sup> Oil spills threaten this delicate ecosystem and harm Indigenous people who depend on it.<sup>50</sup> However, between the years 2000 and 2019, there were at least 474 oil spills in the Peruvian Amazon.<sup>51</sup> Most of the oil spills were due to corroded pipelines and operational failures. This places the flora and fauna at risk. Additionally, oil spills contaminate the rivers. The Amazon rivers are lifelines, offering water, food, and transport. They are also crucial to the wellbeing of Indigenous communities. Due to oil spills, the Indigenous communities have no fish nor land animals for food, nor fresh water to drink.<sup>52</sup> Moreover, the oil and gas projects in the Peruvian Amazon increase deforestation. To access roads, drilling platforms and pipelines are built.<sup>53</sup>

On October 4, 2024, Petroperú, a state-owned company, reported an oil spill on the Peruvian Amazon.<sup>54</sup> Specifically, the spill took place in the Pastaza River. Petroperú claimed the

46 Sharma et al., “Comprehensive Insights into the Impact of Oil Pollution on the Environment,”

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48 Harriet Barber, “I’ve Seen the Dark, Fat Grease Stuck to the Leaves’: Oil and Gas Encroach on Peru’s Uncontacted Peoples,” *The Guardian*, October 17, 2024, <https://www.theguardian.com/global-development/2024/oct/17/ive-seen-the-dark-fat-grease-stuck-to-the-leaves-oil-and-gas-encroach-on-perus-uncontacted-peoples>.

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52 Barber, “I’ve Seen the Dark, Fat Grease Stuck to the Leaves’: Oil and Gas Encroach on Peru’s Uncontacted Peoples,”

53 Barber, “I’ve Seen the Dark, Fat Grease Stuck to the Leaves’: Oil and Gas Encroach on Peru’s Uncontacted Peoples,”

54 Amazon Watch, “Oil Spills, Indigenous Resistance, and the Fight for Justice in the Peruvian Amazon,” Amazon Watch, November 25, 2024, <https://amazonwatch.org/news/2024/1125-oil-spills-indigenous-resistance-and-the-fight-for-justice-in-the-peruvian-amazon>.



Petroperú controlled crude oil leak in the Pastaza River  
Credit: Petroperú

spill was under control. However, it affected over 20 villages, contaminating water and fishing areas. As a result, many of the communities ran out of food and water. Petroperú activated its emergency plan by placing barriers and closing valves. But these steps were not enough. Indigenous leaders, including the Achuar Nationality of Peru (FENAP), said oil kept leaking into the river.<sup>55</sup> This threatened food supplies and public health. The Quechua Indigenous Federation of Pastaza (FEDIQUEP) reported that Petroperú first claimed only 40 barrels were spilled and only affected 3,000 meters squared. Later, the spill was found to cover 18,750 meters squared.<sup>56</sup> The actual size was over six times larger than reported. This underreporting delayed aid and legal action, worsening the crisis. This shows the clear negative impact that oil spills can have on the environment and the communities that depend on them. Yet, there is another important factor to consider. Many countries, like Peru, depend economically on the earnings of oil production. For example, Peru's mining and metals investment guide 2024-25 states that in modern Peru, mining constitutes almost 15 percent of the country's GDP.<sup>57</sup> An increase in the country's mining production is essential. The country needs to increase its oil production for the potential growth of its economy, the improvement of working conditions, and the family income of workers.

UNEA delegates must understand that the problems caused by this spill go beyond cleaning up the environment. The oil spills in Brazil show the clear long-term effects of an oil spill. They show the urgent need to act to prevent the complete destruction of ecosystems. The Pastaza River spill shows the urgent need for rules and policies that focus not only on quick response and cleanup but also on preventing future spills and supporting affected communities in the long term. These policies should consider the specific needs of Indigenous communities and make sure they have a real say in decisions that affect their lands and resources. However, delegates must also consider the economic dependency of many countries on the oil industry. When considering solutions, delegates must find a balance between economic stability and sustainable

development. Solving these issues needs teamwork between governments, NGOs, and Indigenous leaders. This teamwork should include Indigenous knowledge and practices in protecting the environment. It should also ensure fair and respectful ways to compensate communities. Sharing data and technology internationally will strengthen efforts. Together, countries can prevent and manage oil spills better, reducing harm to nature and protecting people. Stopping future spills must be a top goal. This requires better upkeep of pipelines, stronger laws, support for new technology, and a shift to renewable energy. Focusing on prevention is key to protecting the environment and the communities that depend on it.<sup>9</sup>

## Conclusion

The oil industry's effect on biodiversity is one of the most urgent environmental problems today. This threat to biodiversity, compounded by the industry's contribution to climate change and pollution, creates a "triple threat" to the environment that demands immediate and comprehensive action. The increasing loss of experienced professionals, the shift of skills towards the energy transition, and the reduced opportunities for hands-on experience due to fewer spill incidents further exacerbate this challenge. Technology has advanced to help lower the risk of oil spills with tools. These new technologies include drone monitoring, new absorbent materials such as the tri-block copolymer, and AI-powered spill detection. However, progress will take some time. Many countries, especially developing ones, still struggle to put these solutions into practice. The economics of these solutions will also be difficult since developing countries still need cheap energy to help them develop quickly. The oil spill in the Pastaza River, which caused serious harm to Indigenous communities and ecosystems, highlights the need for stricter environmental laws, more accountability from oil companies, and greater involvement of Indigenous groups in decision-making.

Looking ahead, UNEA must focus on cooperation between governments, industries, and indigenous communities to

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56 Geraldine Santos, "Peru: Recent Oil Spill in the Pastaza River Occurred in an Area with 69 Sites Impacted by Hydrocarbons," Mongabay, November 8, 2024, <https://es.mongabay.com/2024/11/peru-reciente-derrame-de-petroleo-en-el-rio-pastaza-ocurrio-en-una-zona-con-69-sitios-impactados-por-hidrocarburos/>.

57 Barber, "I've Seen the Dark, Fat Grease Stuck to the Leaves': Oil and Gas Encroach on Peru's Uncontacted Peoples,"



create lasting solutions that protect biodiversity. This means encouraging public-private partnerships to speed up the use of new technologies, supporting international agreements to share data, and improving AI spill detection. There are also steps that need to be taken in response to spills. Developing stronger rules that prevent spills, manage containment, and ensure affected communities receive fair support are some of the solutions. However, continued scientific development will help uncover new ways to address spills and make it easier to recover from them. More collaboration is needed to make sure that developed and developing countries can bridge the gap in technology. Available technology also needs to be cheaper so that they can be widely used in developing countries. By combining technology, teamwork, and strong policies, UNEA can lead the way toward a future where the oil industry protects both the environment and the rights of local communities.

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Written by Camila Aguilar Figueroa, Alina Castillo, Cristina Rivero, and Analucia Tello

Edited by Jordan Baker, Alina Castillo, Ana Margarita Gil, Christian Hernandez, Therese Salomone, Analucia Tello, and Terry Wang.

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