Forum: Environmental Commission

Issue: Limiting the Consequences of the Recovery of Polluted Rivers in Megacities

Student Officer: Rea Karvouni

Position: Deputy President

Personal Introduction

Dear delegates,

My name is Rea Karvouni and I attend the 10th grade of the German School of Athens. I have been an active member of my school's MUN club for the past three years and have participated in numerous MUN conferences during this time. This year I have been handed the utmost honor of being selected to serve as a Deputy President in the Environmental Commission.

Firstly, I would like to welcome you to the 8th session of ACGMUN and congratulate you on your placement in this committee. The Environmental Commission is a committee well-suited for both beginners as well as more experienced delegates and I can assure you that regardless of your prior MUN experience you will gain significant political and ecological knowledge as well as valuable insights into the workings of MUN.

The first topic, namely "Limiting the consequences of the recovery of polluted rivers in megacities" which I have chosen to address, is a crucial and highly relevant issue in today's world which demands effective action to be taken. This study guide will provide you with an overview of the topic. However, you are strongly encouraged to research further and familiarize yourself with your country's policy, viewpoints as well as involvement in this issue.

If any questions regarding this topic or the conference in general arise, feel free to contact me via E-Mail: rea.karvouni@gmail.com. I look forward to meeting all of you and engaging in thought-provoking discussions on the committee's topics!

Sincerely,

Rea Karvouni

Topic Introduction

Rivers play an indispensable role in sustaining human life as well as supporting ecosystems. They are helpful in many sectors such as provision of drinking water, serving as habitats for a vast range of species, enabling agriculture and crop irrigation. Beyond their importance for the ecology, they are also vital cultural and social spaces, they can be used as recreational areas and are drivers of economic growth through tourism. Furthermore, they help control floods and mitigate further climate impacts, helping to ensure resilience against environmental challenges.

Therefore, their importance to many sectors affecting human life is indisputable and yet, despite their vital significance, more than half of the world's 500 largest rivers are severely polluted[1]. Two key factors, which have exacerbated the contamination of rivers are urbanization and industrialization, particularly in megacities, where the rising demand for urban water resources clashes with insufficient waste management systems. Urban rivers are filled with untreated sewage, industrial runoff and other pollutants and according to the United Nations' 2017 World Water Development Report, even high-income countries treat only 70% of the municipal and industrial wastewater they produce[1], underscoring the global struggle of managing water pollution effectively.

The health of rivers is closely tied to the planet's overall health, however, efforts to rehabilitate polluted rivers often carry unintended consequences. These include economic burdens, social displacement and further environmental degradation, which makes it crucial to address the issue of river pollution through innovative solutions. These should avoid exacerbating harm to populations, economies as well as ecosystems in order to build water-secure cities. Through implementing comprehensive legislation and frameworks leveraging sustainable practices the shared goal of limiting the consequences of the rehabilitation of polluted rivers in megacities.

Definition of Key Terms

Megacities

A megacity can be defined as "a very large city, especially one with more than 10 million people living in it"[2].

[1] Xu, Zuxin. *Lessons from China and Other Developing Countries Making Cities Sustainable through Rehabilitating Polluted Urban Rivers*. https://unhabitat.org/sites/default/files/2020/11/making_cities_sustainable_through_rehabilitating_polluted_urban_rivers.pdf Accessed 15 Dec. 2024.
[2] Cambridge Dictionary. "MEGACITY | Meaning in the Cambridge English Dictionary." *Cambridge.org*, 11 Sept. 2019, dictionary.cambridge.org/dictionary/english/megacity . Accessed 15 Dec. 2024.

Urbanization

Urbanization is "the process by which more and more people leave the countryside to live in cities"[3] and is a largely growing phenomenon in today's society.

Riverine Ecosystem

Riverine ecosystems are defined as "any spring, stream, or river viewed as an ecosystem"[4]

River Pollution

River pollution, also called "water pollution, [and is defined as] the release of substances into subsurface groundwater or into lakes, streams, rivers, estuaries, and oceans to the point that the substances interfere with beneficial use of the water or with the natural functioning of ecosystems. [This includes] the release of substances, such as chemicals, trash, or microorganisms [into bodies of water]"[5]

Urban River

"Urban river means a river within or in proximity to an urban area"[6].

Eutrophication

"A process of pollution that occurs when a lake or stream becomes over-rich in plant nutrient; as a consequence, it becomes overgrown in algae and other aquatic plants. The plants die and decompose. In decomposing the plants rob the water of oxygen and the lake, river or stream becomes lifeless. Nitrate fertilizers which drain from the fields, nutrients from animal wastes and human sewage are the primary causes of eutrophication."[7]

---

[3] "URBANIZATION | Meaning in the Cambridge English Dictionary." *Cambridge.org*, 2019, dictionary.cambridge.org/dictionary/english/urbanization . Accessed 15 Dec. 2024.

[4] "Riverine Ecosystem | Ecological Niche." *Encyclopedia Britannica*, www.britannica.com/science/riverine-ecosystem. Accessed 16 Dec. 2024.

[5] Nathanson, Jerry . "Water Pollution." *Encyclopædia Britannica*, 29 Nov. 2018, www.britannica.com/science/water-pollution. Accessed 15 Dec. 2024.

[6] "Urban River Definition | Law Insider." *Law Insider*, 2024, www.lawinsider.com/dictionary/urban-river. Accessed 15 Dec. 2024.

[7] European Environment Agency. "Eutrophication." *European Environment Agency*, www.eea.europa.eu/archived/archived-content-water-topic/wise-help-centre/glossary-definitions/eutrophication . Accessed 15 Dec. 2024.

Circular Economy

"The circular economy is a system where materials never become waste and nature is regenerated. In a circular economy, products and materials are kept in circulation through processes like maintenance, reuse, refurbishment, remanufacture, recycling, and composting. The circular economy tackles climate change and other global challenges, like biodiversity loss, waste, and pollution, by decoupling economic activity from the consumption of finite resources."[8]

Waterborne Diseases

"Waterborne diseases are those diseases that are transmitted by ingestion of contaminated water, though not only the ingestion of contaminated water can cause disease transmission, but bathing in polluted waters, as well as contact with a wound or open cut can have harmful consequences for humans"[9]

Water Table

The water table can be defined as the "upper level of an underground surface in which the soil or rocks are permanently saturated with water."[10]

Hypoxia

"In ocean and freshwater environments, the term "hypoxia" refers to low or depleted oxygen in a water body. Hypoxia is often associated with the overgrowth of certain species of algae, which can lead to oxygen depletion when they die, sink to the bottom, and decompose."[11]

Trust

From a legal viewpoint a trust is defined as "a legal arrangement in which a person or organization controls property or money for the benefit of another person or organization"[12]. In the

[8] Ellen MacArthur Foundation. "Circular Economy Introduction." *Ellen MacArthur Foundation*, Ellen MacArthur Foundation, 2024, www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview. Accessed 15 Dec. 2024.

[9] "Waterborne Diseases | UNDRR." *Www.undrr.org*, 7 June 2023, www.undrr.org/understanding-disaster-risk/terminology/hips/bi0018. Accessed 15 Dec. 2024.

[10] "Water Table | Hydrology | Britannica." *Encyclopædia Britannica*, 2019, www.britannica.com/science/water-table. Accessed 18 Dec. 2024.

[11] NOAA. "Hypoxia." *Noaa.gov*, 3 Aug. 2022, oceanservice.noaa.gov/hazards/hypoxia/. Accessed 26 Jan. 2025.

[12] "TRUST | Meaning in the Cambridge English Dictionary." *Cambridge.org*, 2024, dictionary.cambridge.org/dictionary/english/trust. Accessed 17 Dec. 2024.

context of this topic, it has to do with entrusting a river to a group of people or organization, in order for them to do something with it -in this case- rehabilitate it.

Background Information

Definition and Importance of Urban Rivers

Urban rivers are waterways that run through large metropolitan areas and play a crucial role both ecologically and in terms of human life. They provide drinking water, places for sports and entertainment and habitats for a wide array of species. Additionally, they support essential urban systems by acting as means of transport for both goods and people, as well as maintaining healthy ecosystems in cities. Lastly, they are integral to city planning, help to manage flood risks and offer cultural as well as aesthetic value to populations living in urban areas. Some examples of urban areas overloading waterways with pollutants, exacerbating polluted rivers, are the Yamuna in Delhi and the Citarum in Indonesia, both of which are health and ecological hazards to the public.

Causes of River Pollution in Megacities

Urbanization and its Effects on Rivers

With urbanization continuously expanding in today's society, humans must adapt, not only to accommodate themselves, but also to foster a harmonious coexistence with nature. At the early stages of the urbanization process a growing number of trees and vegetation was removed, and people began building houses equipped with sewers. This caused a process called storm runoff, which takes place when stormwater runoff picks up trash and pollutants from streets and gets carried through the storm sewer system and into the waterways.

As urban areas sprawled into the countryside, new expanses of concrete and asphalt increased the amount of stormwater surging into sewers -and the amount of pollution spewing out- which ended up getting washed into rivers. By the steady expansion of urban areas and the addition of more roads, houses, industries and other buildings, more wastewater gets discharged into local streams. Moreover, the more pavement a city utilizes, the less rainwater has the ability to soak into the ground, like it would with soil, meaning that the underground water table will have less water to recharge itself and causes the urban rivers' water levels to decline.

Industrial and Chemical Waste

Firstly, it is important to recognize how many industries discharge untreated chemical waste directly into rivers, exploiting the already weak enforcement of environmental legislations. For instance, the textile industry often releases solvents like chlorobenzene, commonly used in dye production, which is highly carcinogenic. Moreover, various heavy metals are commonly found in industrial wastewater and which begin to accumulate, harming aquatic life and biodiversity, as well as making the water unsafe for human use and consumption. Furthermore, as aforementioned, the increased pavement in megacities, in opposition to the wide areas of farmland in rural areas, causes the runoff of rainwater or chemicals to go into sewers, which then end up in streams.

Inadequate and Ineffective Sewage Systems

Aging or outdated sewage systems in many cities allow untreated wastewater to flow directly into rivers. This contributes to hypoxia -also called oxygen depletion- in the water as well as damage to aquatic ecosystems, or the spread of waterborne diseases. When all of the chemical waste, pesticides, rainwater and trash runs off of the streets and into sewers, they are caused to overflow and their contents sometimes back up into people's basements, spill onto streets or pour into rivers and streams. This happens because even after some of the waste caught up in sewage systems gets pumped out and treated, from there, it goes back into the same system, and the cycle resumes. For example, in August 2014 in Detroit, Michigan, heavy rainfall caused nearly 10 billion gallons of raw, untreated sewage to seep into the city's lakes and rivers, leading to concerns regarding contaminated beaches and drinking water supplies.[13]

Just like with pesticides and fertilizers, untreated human sewage comes with many infectious diseases such as salmonella, hepatitis, dysentery, cryptosporidium, and many others. But it's not just the people who play in and around the water who are at risk. In a fifteen-year span "between 1985 and 2000, the Centers for Disease Control (CDC) documented 251 separate disease outbreaks and nearly half a million cases of waterborne illness from polluted drinking water in the United States. Another study by the CDC and the National Academy of Sciences concluded that most illnesses caused by eating tainted seafood have human sewage as the root cause."[14]

[13] Channel, The Weather. "Detroit Summer Rains Caused 10 Billion Gallons in Sewage Overflow | the Weather Channel." *The Weather Channel*, 27 Oct. 2014, weather.com/news/news/detroit-summer-rains-caused-10-billion-gallons-sewage-overflow-20141027. Accessed 26 Jan. 2025.

[14] American Rivers. "How Sewage Pollution Ends up in Rivers | American Rivers." *American Rivers*, 2016, www.americanrivers.org/threats-solutions/clean-water/sewage-pollution/. Accessed 19 Dec. 2024.

Garbage and Pollution

Oftentimes, solid waste and particularly plastic ends up in urban rivers due to the inefficiency of waste management systems. Plastics and other debris not only disrupt aquatic life but also contribute to long- term pollution challenges, as they degrade very slowly and are therefore extremely persistent in the environment. Larger fragments of these waste items and discarded products can often strangle the bodies of animals living in rivers, while smaller ones, typically ones that are less than five millimeters in diameter, are characterized as microplastics, and often end up getting consumed after being mistaken for food.

It is often underestimated at which level this affects aquatic and even human life, as on the first glance the amount of microplastics one consumes might seem very minute, but when taken into perspective, research has shown that the "average person consumes about 53,864 particles of microplastics annually from seafood, [which is] an equivalent to 17 credit cards"[15]. In addition to that, plastic waste accumulation leads to a rise in water levels and may increase urban flood risk. Therefore, this emphasizes the need for further researching plastic and garbage pollution in urban rivers and its relation to changes in the water system behavior, including its influence on urban flood risk.

Agricultural Runoff

Becoming a more and more common phenomenon in megacities, agricultural runoff, which drains from the fields of peri-urban areas, can introduce dangerous chemicals into rivers. These include fertilizers and pesticides, which usually contain high concentrations of chemicals like ammonia and phosphate, nutrients from animal waste and human sewage, which then trigger harmful processes such as eutrophication. This involves the proliferation of algae and other aquatic plants atop the water surface, as a result of the over-enrichment in plant nutrients. This type of vegetation then blocks out sunlight, preventing plants inside the river from effectively engaging in photosynthesis. Many kinds of bacteria then feed off of these plants, causing them to die and decompose. During this, a large part of the water's oxygen is being consumed and causing the river's water to become lifeless. This lack of oxygen is called hypoxia and is a common and very harmful phenomenon in urban rivers and bodies of water.

---

[15] Higgins, Grace. "You Are What You Eat: Plastics in Our Food." *Earth Day*, 16 Aug. 2023, www.earthday.org/you-are-what-you-eat-plastics-in-our-food/. Accessed 26 Jan. 2025.

Another common thing to end up in streams or rivers in megacities are sediment amounts, which are essentially very small particles of sand or rocks, that get deposited into bodies of water after a process called erosion. It is not uncommon for construction projects to be ongoing in urban areas, often taking over the span of years, if not decades, depending on the size and difficulty of the project. These activities often increase sediment levels, which lead to cloudy water and alter the riverbeds.

Oil Spills and Accidental Releases

Urban waterways are susceptible to accidental oil spills from pipelines, ships or drilling activities. Such incidents lead to severe ecological damage and long-term contamination of the water. Oil spills in rivers differ from spills that occur in the open ocean as some oils that get spilled are denser than water and therefore sink to the ground. This makes it way more difficult for experts and oil spill responders to clean up. If the oil pools on the bottom of a river, the only way to remove it is by using vacuum devices, which might seem as an effective solution at first, but is definitely not optimal, as large amounts of clean water and sand get captured along with the oil.

Oil spills in urban rivers also affect the vegetation growing along the water's edge, complicating the oil removal process. Spill responders often attempt to protect these plants; however, if they come into contact with the oil, the response involves either cutting, burning or flushing the vegetation with large amounts of water to remove the oil. These methods can cause additional harm to riverine ecosystems and vegetation, further disrupting the balance of these habitats. Additionally, oil can interact with sediments and other dirt carried by the rivers and the oil-sediment combination settles down to the bottom of the river, making it nearly impossible and very tedious time-consuming to clean out.

Consequences of Polluted Urban Rivers

Environmental Impact

As previously stated, polluted urban rivers have long-term environmental problems including aquatic ecosystem degradation, biodiversity threats and habitat destruction. Harmful substances like fertilizers, untreated sewage, heavy metals, and industrial chemicals alter the water chemistry, reduce oxygen levels (eutrophication) and create "dead zones" where aquatic life cannot survive.

What's more, pollution introduces toxic substances that threaten fish and other species, with eutrophication and algal blooms, further depleting oxygen levels and causing suffocation.

On top of that, polluted rivers exacerbate climate issues by releasing gases like methane and carbon dioxide during aquatic waste decomposition and reducing natural carbon management due to the extensive vegetation loss. Besides, chemical contamination makes water treatment significantly more challenging, requiring greater time, effort, and energy consumption, leading to long term environmental consequences

Health Risks

Contaminated waters become a source of various waterborne diseases such as cholera, dysentery, typhoid and many more. If these contaminants get accumulated into large enough concentrations, they can even potentially become a threat to human health. Someone who consumes even a small number of contaminated fish or shellfish, can be confronted with a number of gastrointestinal complications whose extent could go from simply causing one a stomach ache to -at worst- becoming fatal.

Additionally, drinking from a polluted water source is extremely hazardous to human health, as diseases like the aforementioned ones, could be of mortal consequences, such as cholera, which can lead to severe dehydration and even death if untreated. Although in larger metropolitan cities, there are often wastewater treatment systems, which clean the water, sometimes there are occasions when bacteria or other harmful substances could slip by and bear a vast array of health-related consequences with them.

Furthermore, consumption is not the only way human health could be risked, as bathing in or coming in contact with such polluted river water may pose serious health issues to a large section of the population, particularly in less economically developed countries (LEDCs), where access to clean water is even more constricted and even adequate healthcare is out of question.

Also, as previously mentioned, microplastics are a crucial problem related to human health, which results from rivers being completely filled with plastic pollution. Humans that consume plastic-tainted fish are exposed to plastic-particles, which could potentially cause several chronic illnesses, resulting in average people suffering the effects of microplastics resulting from polluted urban rivers. These tiny particles are frequently consumed by the smallest creatures which are then eaten by larger predators, and so on. In this way, plastic pollution enters the food chain and accumulates in the stomachs of even the largest aquatic species, as well as

animals. This also applies to some heavy metals, chemicals, toxins and other contaminants, which could possibly be health-threatening.

Economic Disadvantages

Polluted rivers affect the economy by discouraging tourism, reducing fishery catch, increasing healthcare costs due to diseases caused by river pollution and many more reasons. Firstly, contaminated and polluted waterways in the middle of the city deter tourists, leading to substantial revenue losses. Likewise, there is a direct impact on fisheries due to the pollution-induced fish deaths and habitat-degradation. The increased healthcare expenditures are also a pressing topic in need of addressing, as longer-term explosions to polluted water can cause illnesses which could lead to escalating medical expenses. Moreover, river restoration projects require significant financial resources, affecting the overall budgeting of cities.

Rehabilitation of Rivers

Overall, river restoration aims to help improve the quality of water and revive biodiversity to create a healthier environment for the species as well as urban residents/city inhabitants. By cleaning the rivers, cities could enhance their global image, boost economic stability through tourism and commerce and improve the public's health and mental wellbeing.

Methods of Recovery

Many methods are currently used to restore polluted rivers, including sewage treatment plants, waste interception systems and community-based cleanup projects.

Installing more Sewage Treatment Plants (STPs) is crucial, as they effectively remove pollutants and produce processed water that can be used. Such systems can be quite costly, but are extremely effective in managing urban wastewater.

Waste interception systems prevent solid waste from even reaching rivers, while reforestation riverbanks by planting trees and vegetation, helps stabilize the soil, reduces runoff, and filters pollutants. It can be relatively inexpensive and has long-term benefits but requires space and continuous maintenance.

In like manner, constructed wetlands also help by mimicking natural filtration processes, removing nutrients, heavy metals, and pathogens

Another method, phytoremediation, uses plants to absorb contaminants, from river sediments. While cost-effective, this method is best suited for small-scale pollution and specific contaminants, therefore it is often not the most preferred option.

Challenges in River Recovery

Financial Challenges

River recovery projects are costly in terms of investment in advanced technologies and long-term maintenance. Budget constraints can limit the scope and sustainability of such initiatives. While many techniques of river restoration have been tried and implemented, oftentimes the response of the aquatic ecosystems has been too weak to justify the high costs of the projects. It has been found that, although effective to some extent, the ecological response varied by species and the extent of damage the river had suffered, ranging from extremely low, to partially effective. However, there have been studies conducted, which ended up having positive outcomes on an economical to ecological viewpoint. Therefore, it has been concluded that some traditional river rehabilitation practices have a high likelihood of failing and there needs to be more research on new and innovative solutions, for them to be worth their high time, energy and -what is often viewed as most important- cost consumption.

Environmental Risks

The dynamic nature of river systems and the many types that exist mean that no two systems are alike, and there is no ideal solution for river restoration that would apply to all sites. Every river restoration scheme therefore needs to be carefully tailored to the specific site. While it does bear many positive consequences and can in many cases, be a huge step towards the successful achievement of river cleanup, there can be consequences to the environment. This could include the release of further toxins into the atmosphere during cleanup efforts and many more, but there is little to no information on how restoration projects affect the world's overall ecology, if implemented on a larger scale.

Major Countries and Organizations Involved

Bangladesh

Bangladesh's river water, which is essential for domestic as well as agricultural and industrial purposes, has been in a terrible state for an extended period. In the last 40 years there have been many cases of heavy pollution in the waterways around Dhaka city itself such as the Buriganga River. It is so polluted that its water appears pitch black, except during the monsoon months, and emits an unpleasant smell through the year. The nation has about 220 small and large rivers and a large chunk of its population depends on rivers for a living and transportation. Contaminants flowing with the water have severely polluted the downstream areas of the rivers. High metal concentrations are frequently observed in river water during the dry season. The Buriganga River and specific areas have almost no oxygen in their water. It is also important to note, that there are consequences for local populations, such as waterborne diseases, skin ailments, and respiratory issues caused by toxic fumes and polluted air near the river, seeing how much the people in Bangladesh utilize rivers in their daily lives.

China

While water pollution may not be the top environmental issue China is dealing with, it remains a significant cause for concern. About 90% of the country's groundwater is severely contaminated by human and industrial waste dumping[16], as well as excessive use of farm fertilizer. The country's water sources contain toxic levels of chemicals such as arsenic, fluorine and sulfates and pollution has been linked as one of the main causes of the high rates of liver, stomach and esophageal cancer.

In China, like in many other countries, factories are able to freely discharge their wastewater into urban bodies of water due to a number of reasons, including weak law enforcement, poorly enforced or lacking environmental regulations and responsible authorities' failure to locate specific polluting industries. While, there have been multiple attempts to solve the issue in this country, such as the 2011 Detox campaign or the Thirteenth Five Year Plan (13FYP) in 2016, when taking into consideration its size, population and industrial power, it is easy to deduct that none of these efforts have made a significant impact in combating polluted rivers and bodies of water in urbanized areas.

[16] Gibson, Carolyn. "Water Pollution in China Is the Country's Worst Environmental Issue." *The Borgen Project*, 22 May 2019, borgenproject.org/water-pollution-in-china/. Accessed 17 Dec. 2024.

France

In France a key example of an urban river becoming seriously polluted and this having direct effects on the residents and people in the area, is the Seine River in Paris. Like many old cities, the capital of the country has a combined sewage system, meaning that the city's wastewater as well as stormwater flow through the exact same pipes. When prolonged rain periods arise, these pipes often get overwhelmed and untreated wastewater flows directly into the river, in opposition to the treatment plant it is supposed to end up at.

As previously explained, this results in bacteria, infections or diseases to get in the river's water. It is also well-known that the 2024 Olympic Games were hosted in Paris, requiring the city to clean not only its roads but also the river, which was going to be used for numerous water sports. One of the means used to prevent the river from further pollution was the creation of a giant basin, in order to capture large amounts of rainwater to keep untreated waste from flowing into the river. Moreover, they renovated the sewage system completely and upgraded water treatment plants. With all of these precautions taken, many still had doubts regarding the athletes' safety and health as even the consumption of a small amount of contaminated water could have many health repercussions or even life-threatening consequences.

River Cities Alliance

The River Cities Alliance (RCA) was launched on November 25th 2021, as a platform for river cities in India to discuss, ideate and exchange information for sustainable urban river management. It currently has 107 member cities with the National Institute of Urban Affairs (NIUA) and other partners providing assistance as river-sensitive development is being planned out. An annual river summit is held, along with the publication of a bi-monthly newsletter. It has also defined five areas of intervention, which include the unpolluted and the unrestricted flow of rivers, the establishment of a connection between the people and the urban rivers, further research to be conducted on this topic and boosting the cities' economy and livelihood. Moreover, training programs for people from all member cities are being conducted, as well as webinars and expert talks. The RCA, through development of Urban River Management Plans (URMPs), expects to encourage member cities to undertake progressive action for urban river management in their cities. According to the official website of the RCA, this has had some success, although they strive to expand their operations on an even larger scale. This will support member cities in accelerating implementation of the United Nations Sustainable Development Goals (SDGs), such as but not limited to SDG 6 which aims for clean water and sanitation, SDG 14, aiming

to conserve bodies of water and more specifically their biodiversity, Goal 15, which aims to protect life on land and rebuild green cover, as riverine ecosystems are restored.

The River Trust

The River Trust defines itself as an umbrella organization for all of its River Trusts across Britain, Northern Ireland and Ireland and consists of experts gathering data and expertise. They rely on donations, partnerships and projects to improve river ecosystems and support the network of member Trusts. As of 2023-2024 they have delivered over 540 river cleans, opened up about 544 kilometers of river for fish passage and installed about 1112 natural flood management measures within the UK and Ireland[17]. They focus on implementing nature-based solutions such as flood management, creating wetlands, planting trees for water and other methods to restore rivers.

Blocs Expected

Alliance 1: Countries in this alliance have significant levels of urban river pollution. Their position typically focuses on providing financial aid, transferring technology, and fostering international collaborations to address the consequences of river recovery. They should prioritize partnerships under global frameworks like the United Nations Sustainable Development Goals and more. Some key members could include the United States of America, India, Germany, Japan, possibly China etc.

Alliance 2: These countries, while less affected by urban river pollution, emphasize sustainable solutions and accountability for polluting industries. They advocate for stricter global standards and cooperative frameworks, aiming to incentivize cleaner practices by polluting nations and industries. Their focus is on ensuring global equity in water resource management and drinking water access in urban areas. Some members of this alliance could include Bangladesh, Kenya, Ethiopia, Brazil, Mexico etc.

[17] "The River Trust - about Us." *The Rivers Trust*, theriverstrust.org/about-us. Accessed 18 Dec. 2024.

Timeline of Events

Date	Description of Event
23 October 2000	European Union Water Framework Directive
25 September 2015	Adoption of the 2030 Agenda for Sustainable Development
11 to 15 March 2019	UNEP Resolution on Addressing Water Pollution
22 to 24 March 2023	UN 2023 Water Conference

Relevant UN Resolutions, Treaties & Events

UNEP Resolution on Addressing Water Pollution

The United Nations Environment Assembly (UNEA) adopted Resolution 3/10, titled "Addressing water pollution to protect and restore water-related ecosystems," during its third session in December 2017. This resolution underscores the critical importance of tackling water pollution to safeguard and rehabilitate ecosystems dependent on water resources. In response, the United Nations Environment Programme (UNEP) established the World Water Quality Alliance (WWQA), a global consortium comprising over 50 partners from all kinds of sectors. The WWQA aims to develop a comprehensive World Water Quality Assessment, as mandated by the resolution, to provide a detailed understanding of global water quality challenges and to promote collaborative efforts in addressing water pollution. This resolution emphasizes the importance of protecting and restoring water-related ecosystems, aligning directly with efforts to recover polluted rivers in megacities by prioritizing improved water quality. Its global framework and initiatives like the World Water Quality Alliance provide tools and collaborative opportunities to address pollution's environmental, health, and economic impacts sustainably.

The Freshwater Challenge

The Freshwater Challenge (FWC) is a country-led initiative that aims to support and integrate the restoration of large amounts of degraded rivers and wetlands by 2030, as well as conserve intact freshwater ecosystems. Including the European Union, forty-nine member nations have joined the Freshwater Challenge thus far. Its aim is to integrate and accelerate targeted interventions for rivers and wetlands, connecting these with national plans and strategies and will increase the overall

investment into the restoration and conservation of freshwater ecosystems. It also wishes to substantially increase the social and economic returns on those investments.

UN Decade on Ecosystem Restoration (2021–2030)

The UN Decade on Ecosystem Restoration aims to prevent, and reverse the degradation of ecosystems on every continent and in every ocean. It is building a strong and broad global movement to ramp up restoration and put the world on track for a sustainable future. That will include building political momentum for restoration as well as thousands of initiatives on the ground.

UN 2023 Water Conference and the Water Action Agenda

The 2023 UN Water Conference, convened from 22-24 March 2023, resulted in an important advance, the adoption of the Water Action Agenda. This agenda presents voluntary actions of countries and actors in order to accomplish the Sustainable Development Goals (SDGs) on water. Bold action is critical to secure human and planetary well-being, while also achieving climate and biodiversity targets. Although water and sanitation are considered as a human right, millions are still not provided with safe managed water and sanitation services creating a loop of water pollution and water scarcity which in turn affect basic needs such as drinking water, agriculture, and energy. Sustainable development is impossible without adequate, clean water available at the right time and place.

Previous Attempts to Solve the Issue

European Water Framework Directive

The key objectives of the Water Framework Directive (WFD) are outlined in its fourth Article and mandate that Member States utilize their River Basin Management Plans (RBMPs) to safeguard and, when necessary, restore water bodies to achieve good status and prevent any deterioration. The directive promotes an integrated approach to water management, ensuring the integrity of entire ecosystems by regulating specific pollutants and establishing relevant regulatory standards. It adopts a river basin district approach to facilitate cooperation among neighboring countries in managing shared rivers and other water bodies. Although this directive has partially helped to work towards cleaner and better water quality in European water bodies, many countries have reportedly struggled to comply with all of its requirements. Research reports have shown that actual water improvement the way the

directive aims to achieve has not complied with its expectations and goals fully, but has worked significantly towards achieving them.

China's Action Plan for Water Pollution Prevention and Control

The Action Plan for Prevention and Control of Water Pollution was issued by China's State Council and sets a comprehensive strategy to tackle water pollution nationwide. It is aimed at improving water quality, preserving ecosystems, and ensuring sustainable water use. The plan outlines short, medium, and long-term goals extending to 2050. Some key objectives it strives to have achieved by 2030 is eliminating black odorous waters in city rivers and expanding drinking water sources and improving water treatment plans and facilities. By 2050 they wish to achieve international aquatic ecosystem improvements and sustainable water management in order to ensure healthy water cycles in urban areas. Their action plan emphasizes a systematic approach which focuses on technology, reform and collaboration to achieve measurable improvements in water quality and ecosystem health.

Mexico City's Integrated River Rehabilitation Projects

Mexico City's water management has been severely criticized, while international agencies have pressed for a transformation in the water system towards incorporating community participation. Still, community involvement in water management affairs remain limited and include just people who have a particular interest, are directly affected or have decision-making capabilities (Barkin Citation2011; Akhmouch Citation2012; Villada-Canela et al. Citation2019). On the other hand, new opportunities are emerging to incorporate the community into some projects, like the Magdalena River Restoration.

Project on Munich's Isar River

The 'Isar Plan', was developed with a view of improving flood risk management, improving vegetation and wildlife habitats and enhancing recreational opportunities. Issues were resolved by flattening banks, relocating flood embankments and constructing public amenities. The results have been dramatic, particularly given its urban setting: the risk of flooding has been turned down, the local environment restored and the degree of exposure of the population to the area increased.

Possible Solutions

Pollution Prevention at the Source

Stopping pollution at the source is one of the most effective ways to keep urban rivers clean. It starts with having stricter rules about what factories and cities can dump into the water. For example,

making factories follow "zero-liquid discharge" policies means they can't release untreated wastewater into rivers at all, forcing them to recycle or treat it first. On top of that, offering rewards or incentives to industries that use cleaner and more sustainable production methods could help cut down pollution at the source. These combined efforts tackle the issue before it even reaches the water and can be a helpful beginning towards river restoration

Advanced Research and Innovation in Finding Better River Restoration Methods

One of the most crucial solutions for tackling urban river pollution is investing in research to discover better and more innovative ways of restoring rivers. Current methods often come with trade-offs, like harming ecosystems or high costs, so there's a real need for alternatives that avoid these issues. For example, exploring bioengineering techniques could lead to more natural and less invasive sediment removal, while developing cleanup systems powered by renewable energy could reduce the environmental footprint. By dedicating more resources to research and collaborating with scientists, engineers, and local communities, solutions can be created that are effective, sustainable, and work well for everyone involved.

Use of Advanced Technology for Cleanup

Advanced technologies, such as floating waste collectors and microbial bioremediation, can effectively remove pollutants from rivers. Drones and AI systems can monitor pollution levels and pinpoint sources of contamination, allowing targeted interventions. While this is going to need further research on the overall impact and worthwhileness

Circular Economy and Waste Management Initiatives

Adopting a circular economy approach focuses on reducing waste generation and recycling materials. Plastic take-back programs significantly decrease the plastic load in waterways. Additionally, incentivizing composting and biodegradable packaging reduces solid waste that might otherwise end up in rivers. Furthermore, waste-to-energy plants can convert urban garbage into electricity, further minimizing environmental impact and working towards the achievement of a circular economy, which basically aims to reuse and recycle everything and utilize it to its maximum potential.

Monitoring and Long-Term Maintenance

Establishing real-time monitoring networks for water quality ensures continuous oversight of urban rivers. For example, the European Union's Water Framework Directive mandates ongoing water

quality assessments across Member States, ensuring compliance with ecological standards. Engaging local communities in stewardship programs helps build accountability and long-term commitment to river health. In your resolutions you could build on this idea and develop strategies on how this monitoring will take place, together with the maintenance of ongoing restoration projects.

Bibliography

General Bibliography

"Action Plan for Prevention and Control of Water Pollution Printed and Distributed." *English.mee.gov.cn*,english.mee.gov.cn/News_service/news_release/201504/t20150427_299595.shtml. Accessed 17 Dec. 2024.

American Rivers. "How Sewage Pollution Ends up in Rivers | American Rivers." *American Rivers*, 2016, www.americanrivers.org/threats-solutions/clean-water/sewage-pollution/. Accessed 19 Dec. 2024.

Babu, Kudrat-E-Khuda, et al. "Negative Effects of the Urban River Pollution on the Environment and Human Health in Bangladesh." *Nature, Environment and Pollution Technology/Nature, Environment and Pollution Technology*, vol. 22, no. 3, 1 Sept. 2023, pp. 1081–1096, https://doi.org/10.46488/nept.2023.v22i03.001.

Bose, Devna. "Here's What to Know about Seine River Water Quality during the Paris Olympics." *AP News*, 30 July 2024, apnews.com/article/olympics-2024-seine-water-quality-bacteria-f04236aa61b936912f9af65f7e3fa9ba. Accessed 20 Dec. 2024.

Cambridge Dictionary. "MEGACITY | Meaning in the Cambridge English Dictionary." *Cambridge.org*,

11 Sept. 2019, dictionary.cambridge.org/dictionary/english/megacity. Accessed 15 Dec. 2024.

"TRUST | Meaning in the Cambridge English Dictionary." *Cambridge.org*, 2024, dictionary.cambridge.org/dictionary/english/trust. Accessed 17 Dec. 2024.

"URBANIZATION | Meaning in the Cambridge English Dictionary." *Cambridge.org*, 2019, dictionary.cambridge.org/dictionary/english/urbanization. Accessed 15 Dec. 2024.

Channel, The Weather. "Detroit Summer Rains Caused 10 Billion Gallons in Sewage Overflow | the
Weather Channel." *The Weather Channel*, 27 Oct. 2014, weather.com/news/news/detroit-summer-rains-caused-10-billion-gallons-sewage-overflow-20141027. Accessed 26 Jan. 2025.

Chin, Anne. "Urban Transformation of River Landscapes in a Global Context." *Geomorphology*, vol.
79, no. 3-4, Sept. 2006, pp. 460–487, https://doi.org/10.1016/j.geomorph.2006.06.033.

"Circular Economy: An Opportunity to Transform Urban Water Services." *World Bank*, 16 Sept. 2021,
www.worldbank.org/en/news/feature/2021/09/16/circular-economy-an-opportunity-to-transform-urban
water-services. Accessed 25 Nov. 2024.

Cottet, Marylise, et al. *What Are the Political, Social, and Economic Issues in River Restoration?*
Genealogy and Current Research Issues. 17 Sept. 2021, pp. 1–47, https://doi.org/10.1002/9781119410010.ch1. Accessed 25 Nov. 2024.

"Displacement Terminology." *GNDR*, www.gndr.org/displacement-terminology/. Accessed 15 Dec.
2024.

Ellen MacArthur Foundation. “Circular Economy Introduction.” *Ellen MacArthur Foundation*, Ellen
MacArthur Foundation, 2024, www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview. Accessed 15 Dec.
2024.

Environment, U. N. “UN 2023 Water Conference.” *UNEP - UN Environment Programme*, 16 Mar.
2023, www.unep.org/un-2023-water-conference. Accessed 20 Dec. 2024.

European Commission. “Water Framework Directive.” *Environment.ec.europa.eu*, 2023, environment.ec.europa.eu/topics/water/water-framework-directive_en. Accessed 20 Dec. 2024.

European Environment Agency. “Eutrophication.” *European Environment Agency*, www.eea.europa.eu/archived/archived-content-water-topic/wise-help-centre/glossary-definitions/eutr
phication. Accessed 15 Dec. 2024.

“Freshwater Challenge | Frontlines of the Climate and Nature Crises.” *Freshwater Challenge*, www.freshwaterchallenge.org/. Accessed 20 Dec. 2024.

García Alba Garciadiego, Fernanda. “Community Participation in Mexico City´S Water Management.
Learning from the Failure of the Magdalena River Restoration Project.” *Urban Water Journal*, 6 Apr.
2022, pp. 1–14, https://doi.org/10.1080/1573062x.2022.2059382.

Gibson, Carolyn. “Water Pollution in China Is the Country’s Worst Environmental Issue.” *The Borgen
Project*, 22 May 2019, borgenproject.org/water-pollution-in-china/. Accessed 17 Dec. 2024.

Higgins, Grace. “You Are What You Eat: Plastics in Our Food.” *Earth Day*, 16 Aug. 2023, www.earthday.org/you-are-what-you-eat-plastics-in-our-food/. Accessed 26 Jan. 2025.

Huang, Youliang, et al. “Social Impacts of Dam-Induced Displacement and Resettlement: A Comparative Case Study in China.” *Sustainability*, vol. 10, no. 11, 2 Nov. 2018, p. 4018, https://doi.org/10.3390/su10114018.

Igini, Martina. “5 Pressing Environmental Issues China Is Dealing with in 2024.” *Earth.org*, 17 Jan.
2024, earth.org/environmental-issues-in-china/. Accessed 20 Dec. 2024.

Jackson, Grace. “Project Summary”: *High-Level Summary Technical Assistance Reports*, vol. 2023,
no. 012, Sept. 2023, p.1.
mlml.sjsu.edu/ccwg/wp-content/uploads/sites/23/2020/01/MoleraTreatment.pdf,
https://doi.org/10.5089/9798400253997.029 Accessed 17 Dec. 2024.

Ji, Xiaomin, et al. “Impacts of Urbanization on River System Structure: A Case Study on Qinhuai
River Basin, Yangtze River Delta.” *Water Science and Technology*, vol. 70, no. 4, 18 June 2014, pp.
671–677, https://doi.org/10.2166/wst.2014.278 Accessed 25 Nov. 2024.

Katharina. “Rivers at Heart: An Integrated Approach to River Management in Mexico.” *The Hague
Academy*, 6 Mar. 2023,
thehagueacademy.com/news/rivers-at-heart-an-integrated-approach-to-river-management-in-mexico/.
Accessed 16 Dec. 2024.

Kruzman, Diana. “Cities Are Investing Billions in New Sewage Systems. They’re Already Obsolete.”
Grist, 8 Mar. 2022,
grist.org/cities/cities-are-investing-billions-in-new-sewage-systems-theyre-already-obsolete/?utm_source=chatgpt.com Accessed 26 Jan. 2025.

Lessons from China and Other Developing Countries Making Cities Sustainable through Rehabilitating Polluted Urban Rivers. Lu, Weiwei, et al. “Assessing the Context and Ecological Effects
of River Restoration – a Meta-Analysis.” *Ecological Engineering*, vol. 136, Oct. 2019, pp. 30–37,
www.sciencedirect.com/science/article/pii/S0925857419302010,
https://doi.org/10.1016/j.ecoleng.2019.06.004 Accessed 20 Dec. 2024.

Nathanson, Jerry . “Water Pollution.” *Encyclopædia Britannica*, 29 Nov. 2018,
www.britannica.com/science/water-pollution Accessed 15 Dec. 2024.

NOAA. “Hypoxia.” *Noaa.gov*, 3 Aug. 2022, oceanservice.noaa.gov/hazards/hypoxia/. Accessed 26
Jan. 2025.

Phong, L. H. “The Relationship between Rivers and Cities: Influences of Urbanization on the Riverine
Zones – a Case Study of Red River Zones in Hanoi, Vietnam.” *Sustainable Development and Planning VII*, 19 May 2015,
www.witpress.com/Secure/elibrary/papers/SDP15/SDP15003FU1.pdf,
https://doi.org/10.2495/sdp150031. Accessed 25 Nov. 2024.

Pollution Solutions. “What Are the Consequences of Having Polluted Rivers?” *Pollution Solutions*

Online, Pollution Solutions, 2021,
www.pollutionsolutions-online.com/news/water-wastewater/17/breaking-news/what-are-the-consequ
nces-of-having-polluted-rivers/56232. Accessed 16 Dec. 2024.

Ponir Hossain, Mohammad. "Living along a "Dead" River in Bangladesh." *Reuters*, 19 Apr. 2023,
www.reuters.com/investigates/special-report/earth-day-bangladesh-river/. Accessed 20 Dec. 2024.

Randell, Heather. "The Challenges of Dam-Induced Displacement: Reducing Risks and Rethinking
Hydropower." *One Earth*, vol. 5, no. 8, Aug. 2022, pp. 849–852,
https://doi.org/10.1016/j.oneear.2022.07.002.

"Read "Meeting the Challenges of Megacities in the Developing World: A Collection of Working Papers" at NAP.edu." *Nap.nationalacademies.org*,
nap.nationalacademies.org/read/5267/chapter/3#40 Accessed 16 Dec. 2024.

"River Cities Alliance – a City Led Movement." *Niua.in*, 2023, niua.in/rca/. Accessed 20 Dec. 2024.

"River Cities Alliance: Partnership for Developing International River Sensitive Cities | Department of
Economic and Social Affairs." *Un.org*, 31 Mar. 2026,
sdgs.un.org/partnerships/river-cities-alliance-partnership-developing-international-river-sensitive-cities
Accessed 20 Dec. 2024.

"River Restoration - an Overview | ScienceDirect Topics." *Www.sciencedirect.com*,
www.sciencedirect.com/topics/earth-and-planetary-sciences/river-restoration. Accessed 20 Dec.
2024.

"Riverine Ecosystem | Ecological Niche." *Encyclopedia Britannica*, www.britannica.com/science/riverine-ecosystem Accessed 16 Dec. 2024.

Stadtler, Debbie. "Sewage Overflows Impact US Cities/Public Health - WCP Online." *WCP Online*, 15 Dec. 2014, wcponline.com/2014/12/15/sewage-overflows-impact-us-citiespublic-health/?utm_source=chatgpt.com Accessed 24 Jan. 2025.

"The Economics of River Restoration." *Www.ecrr.org*, www.ecrr.org/River-Restoration/Economicsm Accessed 20 Dec. 2024.

The River Restoration Centre. "Why Restore? | the RRC." *Www.therrc.co.uk*, 2014, www.therrc.co.uk/why-restore Accessed 20 Dec. 2024.

"The River Trust - about Us." *The Rivers Trust*, theriverstrust.org/about-us. Accessed 18 Dec. 2024.

Theodoropoulos, Christos, et al. "River Restoration Is Prone to Failure Unless Pre-Optimized within a Mechanistic Ecological Framework | Insights from a Model-Based Case Study." *Water Research*, vol. 173, Apr. 2020, p. 115550, https://doi.org/10.1016/j.watres.2020.115550. Accessed 20 Dec. 2024.

"Together, for Rivers." *The Rivers Trust*, theriverstrust.org/. Accessed 22 Nov. 2024.

"UN Decade on Restoration." *UN Decade on Restoration*, 2021, www.decadeonrestoration.org/. Accessed 20 Dec. 2024.

UNEP. “FAQs on Water Quality.” *UNEP - UN Environment Programme*, 28 Apr. 2022, www.unep.org/explore-topics/water/what-we-do/world-water-quality-alliance-wwqa-partnership-effort/
aqs-water Accessed 20 Dec. 2024.

“Urban River Definition | Law Insider.” *Law Insider*, 2024, www.lawinsider.com/dictionary/urban-river.
Accessed 15 Dec. 2024.

“Urban Waterways Reborn: European Cities Leading the Change in River Restoration and Revitalization.” *ArchDaily*, 12 Feb. 2024, www.archdaily.com/1013255/urban-waterways-reborn-european-cities-leading-the-charge-in-river-re
toration-and-revitalization. Accessed 22 Nov. 2024.

“Water Table | Hydrology | Britannica.” *Encyclopædia Britannica*, 2019, www.britannica.com/science/water-table. Accessed 18 Dec. 2024.

“Waterborne Diseases | UNDRR.” *Www.undrr.org*, 7 June 2023, www.undrr.org/understanding-disaster-risk/terminology/hips/bi0018. Accessed 15 Dec. 2024.

Wissmar, R, and P Bisson. *1. Strategies for Restoring Rivers: Problems and Opportunities*.
Wuijts, Susanne, et al. “Moving Forward to Achieve the Ambitions of the European Water Framework
Directive: Lessons Learned from the Netherlands.” *Journal of Environmental Management*, vol. 333, 1
May 2023, p. 117424, www.sciencedirect.com/science/article/pii/S0301479723002128, https://doi.org/10.1016/j.jenvman.2023.117424. Accessed 29 Jan. 2025.