

OPERATIONAL BRIEF

Marine Pollution

BLUE ECONOMY FOR RESILIENT AFRICA PROGRAM

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1818 H Street NW, Washington DC 20433
Telephone: 202-473-1000 | Internet: www.worldbank.org

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This brief was written by Kanako Hasegawa (Environmental Specialist). The series of briefs was prepared by a team led by Lia Carol Sieghart (Practice Manager), Christian Albert Peter (Practice Manager), Sanjay Srivastava (Practice Manager), Maria Sarraf (Practice Manager), Iain Shuker (Practice Manager) and Africa Eshogba Olojoba (Practice Manager). The team includes Peter Kristensen (Lead Environmental Specialist), Marcelo Hector Acerbi (Senior Environmental Specialist), Sajid Anwar (Environmental Specialist), Darshani De Silva (Senior Environmental Specialist), Nagaraja Rao Harshadeep (Lead Environmental Specialist), Kanako Hasegawa (Environmental Specialist), Ede Ijjasz-Vasquez (Lead Consultant), Juliana Castano Isaza (Natural Resources Management Specialist), Federico Scodelaro (Consultant), Madjiguene Seck (Senior Partnership Specialist), Ruth Tiffer-Sotomayor (Senior Environmental Specialist), and Phoebe Girouard Spencer (Environmental Economist).

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About the Blue Economy for Resilient Africa Program

The Blue Economy generated nearly US\$300 billion for the African continent in 2018, creating 49 million jobs in the process. These and other crucial benefits—most notably food security, livelihoods, biodiversity, and resilience to the effects of climate change—are entirely dependent on the health and productivity of coastal and marine areas.

By safeguarding productive coastal landscapes, countries will be in a better position to take full advantage of future Blue Economy opportunities, which range from sustainable blue energy to aquaculture to blue carbon.

The World Bank's Blue Economy for Resilient Africa Program, announced at COP27, will provide multisectoral analytical, financial, and policy support to Africa's coastal countries and island states to help them leverage the opportunities—and manage the risks—inherent in scaling up their Blue Economies.

About this series of briefs

The Blue Solutions for Africa series of operational briefs captures how a thriving Blue Economy can help African countries better manage the development challenges they face while supporting economic growth, sustainable livelihoods, and the health of these precious ecosystems.

THE BRIEFS COVER THE FOLLOWING THEMATIC AREAS

- Climate change
- Coastal and marine biodiversity and habitats
- Sustainable fisheries
- Marine pollution
- Jobs and livelihoods
- Participatory marine spatial planning
- Data management and knowledge creation
- Innovative financing instruments
- Developing and incentivizing institutions
- New frontiers of innovation



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Key Messages



A resilient Blue Economy relies on healthy, pollution-free marine and coastal ecosystems.



A coordinated set of actions is needed to achieve required systemic change for a circular economy. These actions need to take place upstream and downstream of the value chains.



The solutions include promoting a circular economy approach, improving solid waste infrastructure and services, and strong monitoring of plastic pollution for proactive action and removal. For wastewater, the use of practical low-cost technologies, with an emphasis on circular economy approaches, is gaining attention.



A broad range of innovative finance options will be needed to implement these solutions.



Better oil spill detection and monitoring are needed to better manage oil spills. A clear regulatory framework and national response systems (with regional coordination and cooperation), along with contingency plans and training, are needed to improve the response when such spills are detected.



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Introduction

Across Africa, rising populations and increased socioeconomic activity in coastal areas are resulting in increasing marine pollution. Rather than expand their Blue Economies, countries are instead needing to combat pollution in coastal and marine waters to mitigate the threats posed to biodiversity, ecosystem resilience, food security, and human health.

This brief presents the challenges and potential solutions for three types of marine pollution: plastics, wastewater, and oil spills. The World Bank is well placed to provide analytical, technical, policy and capacity development assistance relating to marine pollution. In addition, the World Bank provides financing through a range of instruments for initiatives that seek to combat marine pollution by improving waste management, strengthening and expanding wastewater treatment, and protecting the marine and coastal environment. With ocean health widely recognized as a key contributor for addressing climate change, the World Bank's work will enable African countries to transition towards a resilient and inclusive Blue Economy.



The Challenge

Africa is facing intensifying marine pollution, driven by a rapidly growing population, urbanization, and changing consumer purchasing habits. The coastal populations in the Middle East and North Africa (MENA) and Sub-Saharan Africa are expected to grow by 18 percent and 42 percent respectively between 2020 and 2035.

Coastal areas are hotspots for development activities in many African countries. In Morocco, for example, coastal areas are home to more than 60 percent of its population and host to 90 percent of its industries. Such intensification of activity is resulting in more pollution from land discharging into rivers and seas. Indeed, by 2025, annual municipal solid waste generation in the region is projected to double by 2025 from the 2012 baseline of 125 million tons.

Marine pollution is a major threat to marine health and therefore to Africa's Blue Economy, which is expected to be worth US\$405 billion and generate 57 million jobs by 2030. Plastic pollution in the ocean alone costs 0.8 percent of gross domestic product (GDP) on average in the MENA region. Marine pollution comes at a high cost and hampers socioeconomic development by impacting fisheries, which endangers the livelihoods and food security of coastal communities, and other economic activities such as tourism and shipping.

Besides affecting key economic sectors, marine pollution undermines the ocean's resilience and potential to mitigate climate change impacts. Globally, the ocean is estimated to absorb 30 percent of anthropogenic carbon dioxide (CO₂) emissions, with

key ecosystems such as seagrass, mangroves, and salt marshes absorbing up to 1,000 tons of carbon per hectare per year—much higher than most terrestrial ecosystems. Marine pollution, including from oil spills, negatively impacts these critical ecosystem functions. During the 2020 *MV Wakashio* oil spill in Mauritius, about 1,000 tons of oil was spilled into the ocean, affecting carbon-storing ecosystems, including seagrass and mangrove forests.

Addressing marine pollution in Africa will provide multiple benefits, including climate benefits, biodiversity conservation, and food security, while protecting livelihoods and human health, and reducing economic loss. Investing in pollution management to protect Africa's blue assets is key for governments to reach the potential of the Blue Economy.

While progress has been made, African countries continue to face challenges with marine pollution management due to inadequate governance and institutional frameworks, lack of financing for developing and maintaining infrastructure, and lack of equipment for pollution control.

LINKING MARINE POLLUTION WITH CLIMATE CHANGE

The following examples demonstrate how climate change can worsen the effects of marine pollution, further threatening the development of Africa's Blue Economy.

INTEGRATED APPROACHES ARE NEEDED TO CONSERVE MARINE AND COASTAL ECOSYSTEMS AND ADAPT POLLUTION MANAGEMENT MEASURES TO CHANGING CLIMATIC CONDITIONS.



Marine plastic pollution and climate change

Plastics originate from fossil fuels and contribute to greenhouse gas emissions at various stages of its usage cycle. Plastics can also increase flooding risks under intensifying weather events due to climate change by blocking stormwater drainage systems. Stagnant water in blocked systems can increase the risks of vector-borne diseases, such as malaria. Localized flooding can occur in areas without adequate drainage, including slum areas. This is of particular concern in Sub-Saharan Africa, where 53.6 percent of urban population live in slums.



Wastewater and climate change

Stormwater from intensifying rainfalls can infiltrate existing wastewater networks and lead to the discharge of untreated wastewater into the marine environment. Sea-level rise can also damage existing wastewater treatment infrastructure. Aging wastewater treatments plants throughout the continent are of concern due to this vulnerability.



Oil spills and climate change

An increase in extreme weather events, especially in low-lying coastal areas, will increase the risk of oil spills. Weather events such as hurricanes and flooding can damage oil infrastructure, including refineries, and can lead to oil spills. Oil spills affect coastal ecosystems such as mangroves, coral reefs, and seagrasses, which play a crucial role in disaster risk reduction. This increases vulnerability to climatic events.



Marine plastic pollution

In 2015, Africa produced 19 million tons of plastic waste, of which 88.5 percent—amounting to 17 million tons—was thought to be mismanaged. Demographic changes, continuing rapid urbanization, and poor waste management is expected to result in Africa becoming the becoming the largest contributor to global mismanaged plastic waste by 2060.

Plastic waste pollution, aggravated by inefficient waste collection and limited recycling capabilities, is prevalent across Africa. On average, a MENA inhabitant disperses more than 6 kilograms (kg) of plastics per year into the ocean, while a Sub-Saharan African inhabitant disperses more than 5 kg per year. Mismanaged plastic waste is expected to increase significantly between 2010 and 2025, especially in coastal countries such as Nigeria, Egypt, Algeria, South Africa, Morocco, and Senegal. Countries across Africa need to invest in upstream policies to reduce single-use plastics, improve waste management and resource recovery, manage public health risks, and enhance opportunities for livelihoods and jobs from reuse, recycling, and recovery.

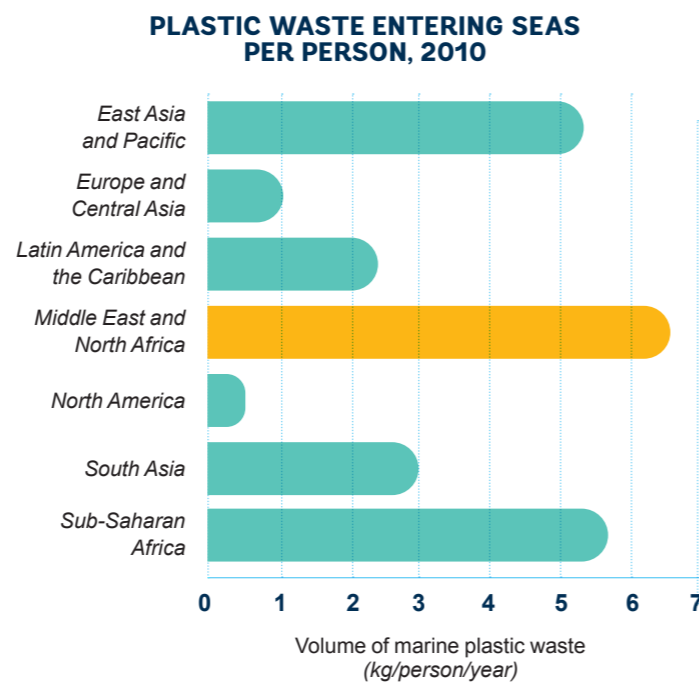


Figure 1: Plastic waste entering seas per person, 2010
Source: World Bank, 2022



Wastewater

Despite the progress in wastewater collection and treatment, untreated wastewater continues to be discharged into the marine environment, either directly or indirectly through freshwater ecosystems. (Wastewater refers to the combination of one or more of domestic, commercial, and industrial effluents, storm water, other urban-run-off, and agricultural, horticultural, and aquaculture effluent.) In Morocco, for example, 52 percent of sewage is estimated to be discharged into the sea without any treatment. Wastewater inputs can lead to eutrophication, algal blooms, reduction of oxygen, and the creation of dead zones in the ocean. Untreated wastewater also costs society: in Senegal, the cost of untreated domestic wastewater amounts to US\$41 million.

Sewage is of particular concern given the lack of sewerage collection systems and the growth of peri-urban informal settlements. In Africa, 779 million people lacked access to basic sanitation services and, of those, 208 million still practiced open defecation in 2020. Due to a lack of sanitation, many people in Africa continue to suffer from water-related diseases. Limited infrastructure, water-quality monitoring, and poor operation and maintenance pose challenges to wastewater management in the region.



Oil spills

Oil spills—the release of petroleum hydrocarbon into the marine environment—are often linked to accidents of vessels, pipelines, refineries, drilling rigs, and storage facilities. Land-based sources, such as untreated wastewater, also lead to the discharge of oil into the marine environment. In Africa, 6.69 tons of oil are estimated to be accidentally spilled for every million tons of crude oil produced.

Oil spills can have significant economic impacts, hindering socioeconomic growth opportunities. In Nigeria's Niger Delta, for example, more than 9,000 spills were recorded between 2006 and 2015. These spills affected terrestrial and marine resources such as mangrove forests, and in some cases led to the the loss of ancestral homes, agricultural land and fishing grounds, and the reduction of the fish population. In 2018 alone, the cost of oil spills in the coastal Delta was estimated at US\$66 million, equivalent to 0.5 percent of its GDP.

In Nigeria's Niger Delta,
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2006 and 2015.



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What is Needed

African countries need to decisively address marine pollution if they wish to develop a sustainable Blue Economy. Holistic approaches are needed to restore and rebuild the resilience of marine and coastal ecosystems. While different types of marine pollution require different solutions, the following general approaches are useful for addressing the three types of marine pollution.



Use the source-to-sea approach. With the high density of people living near river systems in Africa, rivers are likely to transport land-based pollutants to the ocean. The source-to-sea approach is based on systems thinking and acknowledges the interdependence and connectivity of river basins,

deltas, estuaries, coasts, and marine ecosystems. Ecosystems are connected through flows of water, biota, sediment, materials, and pollutants. The approach can be used not only to address marine pollution, but also to plan climate actions. For example, it can be used to understand the systemic impact climate change has on flows and pollutants, and to plan necessary mitigation and adaptation actions.



Promote circular economy strategies. The circular economy approach aims to reduce waste to a minimum through sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials. Circular economy approaches can be used to develop solutions throughout the plastic lifecycle. These include using alternative plant-based sources of plastics; redesigning products; and reusing and recycling plastics. Shifting to a circular plastic economy is estimated to generate 700,000 jobs by 2040, mainly in the Global South. The approach presents opportunities for Africa to create much-needed new jobs.



Use preventative actions, precautionary principles, and the “polluter pays” principle. Preventing oil spills is much more cost-effective than responding to them and could avoid serious and irreversible damage to the marine environment. The “polluter pays” principle means that those who pollute should bear the costs of the damage to the marine environment. Applying fees on plastic bags and extended producer responsibility schemes are examples of how this principle is applied.



Enhance monitoring and data management.

Integrated data on marine pollution—which includes physical, chemical, biological, and geographical data—are often unavailable in Africa. Regularly monitoring marine pollution is key for making evidence-based decisions, ensuring the sustainable use of marine resources, and developing the Blue Economy. Monitoring also helps evaluate the impacts of policy and management interventions.



Strengthen transboundary cooperation.

Marine pollution is a transboundary challenge that requires regional and international cooperation. Regional seas agreements (such as the Barcelona, Nairobi, Abidjan, and Jeddah conventions) provide frameworks for regional cooperation on marine pollution.



Engage stakeholders across sectors and stakeholder groups.

All stakeholders need to join forces to address marine pollution. In the case of plastics, for example, concerted action by stakeholders across the plastics value chain—from plastic producers to waste managers—is needed to reduce marine plastic pollution. When engaging stakeholders, gender-based differences in the impact of pollution should be considered to address gender inequality, which remains high in Africa.



Marine plastic pollution

Addressing marine plastic pollution requires systemic change through a range of interventions both upstream and downstream the value chain. These include phasing out unnecessary, avoidable, and problematic products and polymers; developing incentives and fiscal instruments to promote circularity; developing policy measures on the use of plastics in agriculture; investing in waste management; improving port reception facilities; enhancing monitoring; investing in research and innovation; and promoting behavior change.

African countries have already taken steps to address this growing concern, with at least 29 nations having regulatory frameworks on plastics. Rwanda was the first African country to place legislative bans on plastic bags in 2008. In 2019, the law was extended to all single-use plastic items.

Innovative initiatives are also emerging, such as the new waste collection scheme by WeCyclers in Nigeria.

Some solutions to marine plastic pollution can simultaneously address climate change. For example, removing harmful subsidies on fossil fuels could help uptake alternative materials and incentivize the use of recycled plastics, as opposed to virgin plastics, while reducing carbon emissions.

Currently only four percent of municipal waste is recycled in Africa. However, diverting waste for reuse, recovery, and recycling could generate up to US\$8 billion per year for the continent while creating jobs. In South Africa, for example, 46.3 percent of plastic was recycled and the sector provided more than 7,800 formal jobs in 2018.



Wastewater

Almost all countries in Africa are impacted by water scarcity, and the situation is likely to worsen due to climate change. At the same time, demand for energy and food across the continent is growing. Applying circular economy approaches to wastewater can help African countries shift away from treating wastewater as waste and move towards resource recovery. Resource recovery measures could include using treated water for domestic flushing, gardening purposes, irrigation, aquaculture, and industrial uses; recovering nutrients and organic matter as fertilizer; generating biogas through anaerobic digestion; and using sludge and sludge ash to manufacture bricks and other building materials.

There are already several successful examples of circular economy approaches in Africa and across the world. In Durban, South Africa, for example, a public-private partnership was formed with a paper industry and an oil refinery to recycle treated wastewater for industrial reuse. The private sector covered the project cost, totaling R72 million (about US\$4 million), for the municipality to upgrade the existing treatment facilities. This not only

reduced wastewater pollution but also increased the sustainability of municipal wastewater management. And in New Cairo, Egypt, a public-private project supported by the International Finance Corporation, the private sector arm of the World Bank Group, has resulted in the construction of a new wastewater treatment plant that is able to treat 250,000 cubic meters of wastewater a day. The resulting water is used for agricultural purposes, while the sludge by-product is sold to the cement industry.

To move towards resource recovery and reduce marine pollution, African countries need to invest in wastewater management through a range of interventions. These include: strengthening policy and governance frameworks; establishing water-quality standards; investing in sanitation and wastewater treatment facilities; improving monitoring of effluent quality; developing and applying innovative technologies suitable for the local context; enhancing capacity of wastewater professionals; and promoting public participation.



Oil spills

Prevention is of paramount importance. It costs less than responding to oil-spill incidents. African countries need to invest in prevention and improving preparedness. Relevant measures include establishing a legislative and regulatory framework; developing a reliable national system for preparedness and response with robust contingency plans; conducting training and capacity building; and procuring and maintaining equipment for response actions. Prescribed response actions will depend on various factors such as the type, scale, and location of the oil spill, but in general will involve the use of dispersant chemicals and the use of booms and skimmers to contain and recover from the spill.

Various technologies, such as Earth observation, can help African countries monitor oil spills at a reduced cost compared to boat or aerial surveys. In Ghana, for example, an Earth observation service was used to identify large-area spills and discharges, which were occurring at least every month in the same location (Figure 3). Cost-effective detection of oil spill is important in the context of newly discovered oil and gas deposits, and increasing maritime traffic in West Africa.

How the World Bank Group Contributes to Solutions

The World Bank provides analytical support and investments tailored to Africa's regional and national contexts and the various pollution challenges.



Marine plastic pollution

The World Bank has developed various tools to help policymakers across the world formulate a coherent set of policies to address marine plastic pollution. The recent report, *Where Is the Value in the Chain? Pathways out of Plastic Pollution*, presents two new such tools: the Plastics Policy Simulator, which helps describe country-level impacts of different policy instruments and policy packages on individual economic agents and on the plastics value chain; and the Plastic Substitution Tradeoff Estimator, which can inform target-setting by estimating the external costs of 10 plastic products and their alternatives along their lifecycle.

Within Africa, the World Bank provides analytical and technical support to governments seeking solutions to marine plastic waste. It works with governments to develop national action plans, which can play an important role in the future implementation of an international, legally binding instrument on marine litter, which is currently being [negotiated](#). The World Bank also support

governments in assessing marine plastic pollution, developing policies and regulations, conducting market studies on plastic circularity, raising awareness, and promoting innovation.

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With the World Bank's technical and analytical support:

- Morocco has prepared a [national strategy and an action plan](#) for plastic-free coastlines based on [analytical work](#) under the [MENA BLUE program](#).
- Tanzania used drone images to assess marine plastic pollution at 11 coastal hotspots in the first such assessment in the country. The drone footage was supplemented by on-site hand-sorting.
- Ghana is developing an extended plastic producer responsibility policy for plastic packaging, including an e-registration system, under the framework of the [Greater Accra Resilient and Integrated Development Project](#).
- Mozambique developed a [Plastics Social Innovation Process](#) and assessed its [circular economy opportunities](#) to create an enabling environment for innovation under the MozAzul Program.
- Nigeria is conducting a series of analyses that includes an assessment of solid waste management and marine plastic pollution; value-chain diagnostics; and an assessment of health care facilities' plastic waste management under COVID-19.
- Tunisia also conducted an [assessment of the status of marine plastic pollution](#) under the [MENA BLUE program](#).
- Senegal embarked on the [Municipal Solid Waste Management Project](#), an initiative designed to help waste-pickers with social, entrepreneurial, and skills development. The project is also funding a recycling facility to improve management of the recycling process.
- Egypt is improving the management of all waste streams (municipal solid waste, health care waste, electronic waste, and plastic waste) by applying circular economy and extended producer responsibility concepts under the [Egypt Greater Cairo Air Pollution Management and Climate Change Project](#), a US\$200 million project supported by the Global Environmental Facility (US\$10 million) and PROBLUE (US\$0.485 million).

Regionally, the World Bank's [West Africa Coastal Areas Management \(WACA\)](#) program helps countries [curb marine plastic pollution](#), create finance opportunities, develop innovative solutions, and spur citizen engagement to make coastal communities more resilient. The program is currently conducting technical work to address key knowledge and data gaps about plastic pollution and the value chain in West Africa in order to contribute to government and regional agendas.

The World Bank also provides financing for solutions that address marine plastic pollution. The World Bank currently supports various countries across the world as they seek to harmonize policies; create platforms for innovation and financing; access grants for plastic solutions; and improve plastic waste management at the national and subnational level to reduce plastic pollution from municipal solid waste.



Figure 2: NGO workers sort through plastic waste to identify the types, amounts, and sources of plastic in a project funded through the World Bank's [PROBLUE Trust Fund](#). Source: [World Bank, 2022](#)

The World Bank provides analytical assistance to African countries that seek to implement circular and resilience principles into how they manage their wastewater.

The World Bank produced a [report](#) for Senegal noting that a circular economy approach could see wastewater being reused for irrigation and to recharge aquifers, while wetlands and green infrastructure could be used to improve stormwater management.

The World Bank provides capacity building, technical assistance, and finance for investment projects to enhance wastewater management, improve sanitation, and reduce marine pollution at both the national and regional levels. At the regional level, the World Bank provides platforms that support capacity building, establishes network of water professionals for knowledge-sharing, and provides analytical and advisory services. At the national level, it works with governments to improve their sanitation services, better manage wastewater, and reduce marine pollution.

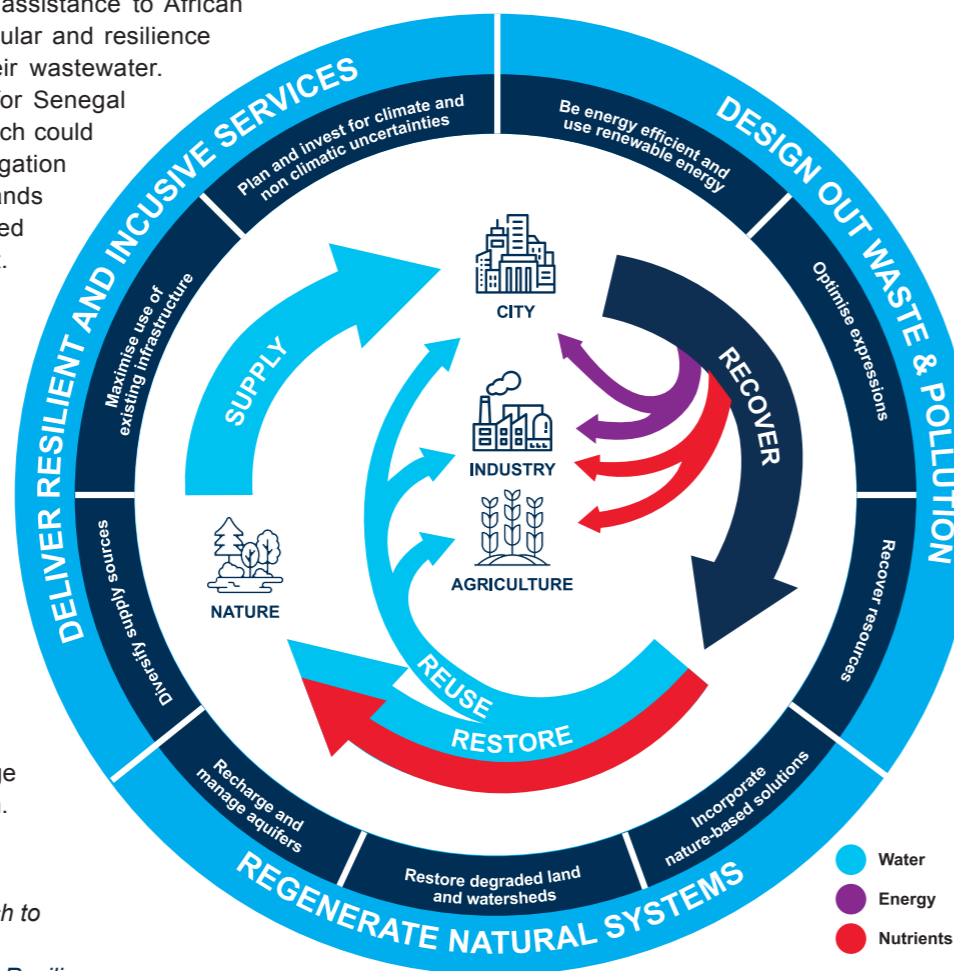


Figure 3: The circular economy approach to wastewater management.
Source: [Water in Circular Economy and Resilience](#)

Case study

TUNISIAN WASTEWATER PROJECT IMPROVES DISCHARGE INTO MEDITERRANEAN SEA

The [Northern Tunis Wastewater Project](#) in Tunisia, a project co-financed with the Global Environment Facility, aims to improve the discharge of treated wastewater into the Mediterranean Sea by constructing underground channels and outfall, and a wastewater storage basin.

The impact has been clear: water quality along the coast has improved since 2015 (Figure 4) and, for the first time in years, Tunisia's health authorities opened Raoued Beach, just north of Tunis, for swimming, giving a boost to the local economy.

The project also supports improved water-quality monitoring and promotes the reuse of treated wastewater for farming and urban spaces.

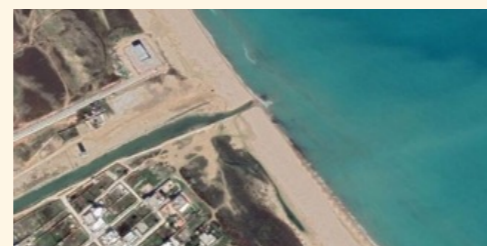
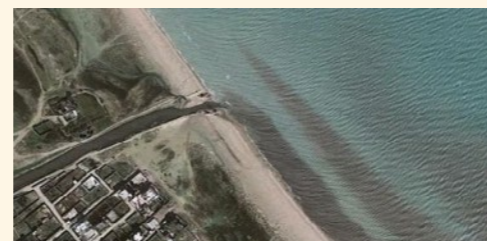


Figure 4: Municipal wastewater from the El Khelij drainage canal, north of Tunis, in 2015 (top) and after 2020 (bottom). Piping wastewater under land and sea has proven to be visibly better for the environment.
Source: [World Bank](#)

The World Bank supports countries and regions seeking to prevent oil spills and enhance preparedness to respond when such spills do occur in the marine environment. For example, the World Bank has supported:

- The improvement of preparedness in Morocco under the [Blue Economy Program for Results Program](#) through training, and in Ghana (under the [West Africa Coastal Areas Management Program](#)) through training and equipment.
- Underwater and surface inspections of the abandoned Sèmè-Podji oil platform in Benin to inform updated feasibility studies into decommissioning the platform and an environmental monitoring plan to manage the site's pollution risks. This project was done through the [West Africa Coastal Areas Management Program](#).
- The development of a [regional oil spill contingency plan](#) for Red Sea and Guld of Aden countries and the establishment of a regional marine emergency mutual aid center in Egypt.

The World Bank also support emergency responses to oil spill incidents across the world. Response activities can include containment, clean-up, provision of protective equipment to volunteers and community members, and consultations with fisher people who have lost livelihoods.



What Success will Look Like

Investments to reduce and prevent marine pollution are necessary for Africa to harness the potential of the Blue Economy.

African countries need to implement integrated approaches to address marine pollution while building resilience to climate change. Application of circular economy approaches can present an opportunity for the countries not only to reduce pollution, but also to use waste and wastewater as a resource and create socioeconomic opportunities.

Significant investment is needed to move towards pollution-free development pathways.

The World Bank therefore provides support to African countries and regions by conducting assessments, developing policies, strengthen institutional capacity, enhancing monitoring, and investing in solutions, including infrastructure development, so that the continent can develop a more inclusive and resilient Blue Economy.

