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High-level segment

Towards a pollution-free planet

Report of the Executive Director

Summary

The Executive Director of the United Nations Environment Programme submits to the United Nations Environment Assembly of the United Nations Environment Programme a report entitled “Towards a pollution-free planet”, which describes the challenges posed by global pollution, outlines current efforts to address pollution and suggests 50 actions to tackle the problem. The Committee of Permanent Representatives to the Environment Programme, at its extraordinary meeting held on 5 December 2016, approved “pollution” as the generic theme of the third session of the United Nations Environment Assembly. The Committee of Permanent Representatives, at its 138th meeting, held on 10 March 2017, endorsed that proposal and agreed that the theme of the Assembly should be “Towards a pollution-free planet”. The present report has been produced in response to that decision.¹

* UNEP/EA.3/1.

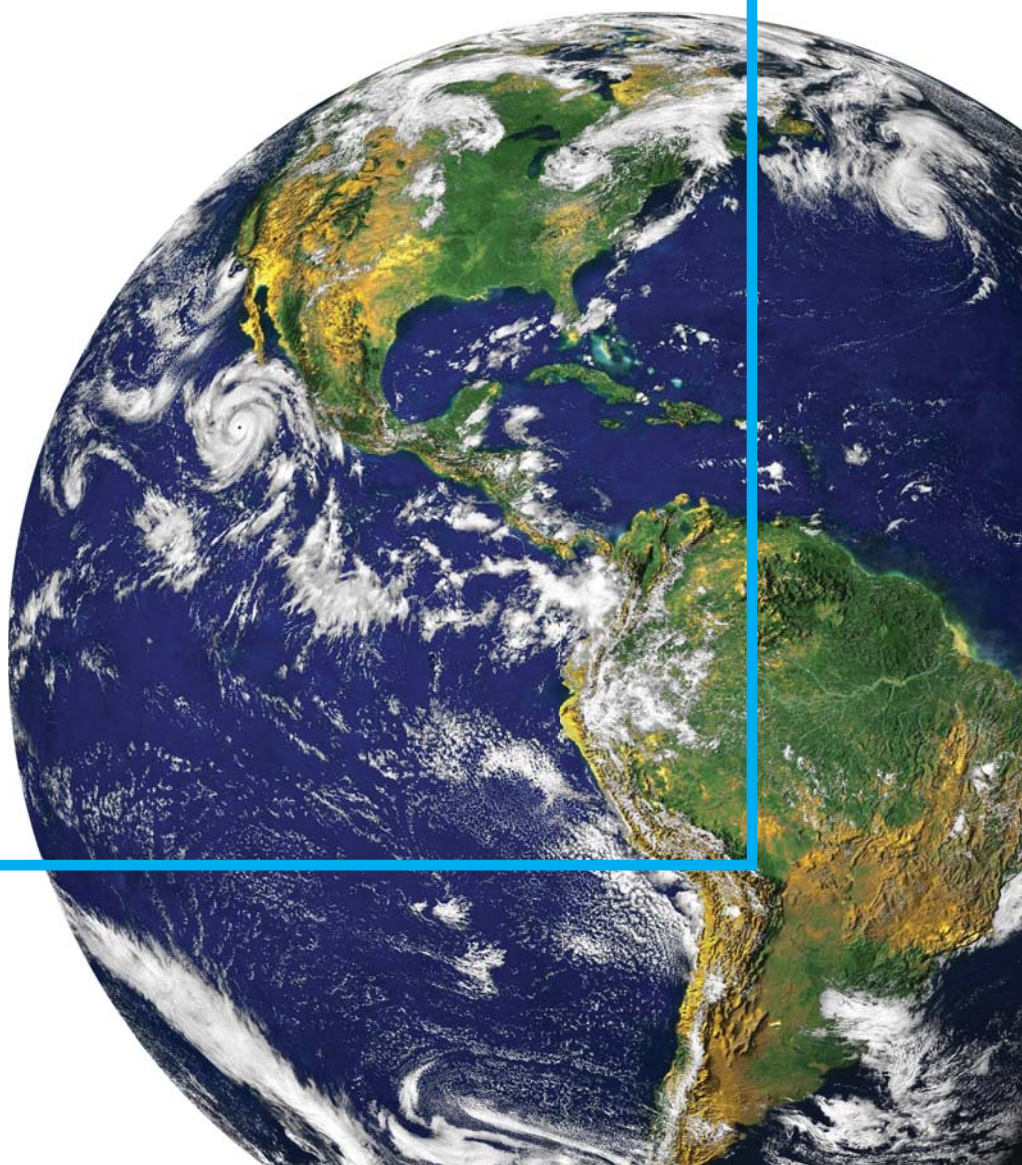
¹ The present report is a condensed version of the full-length report, *Towards a Pollution-free Planet*, which is available at <http://www.unep.org/assembly/backgroundreport>.

Towards a pollution-free planet

Report of the Executive Director *

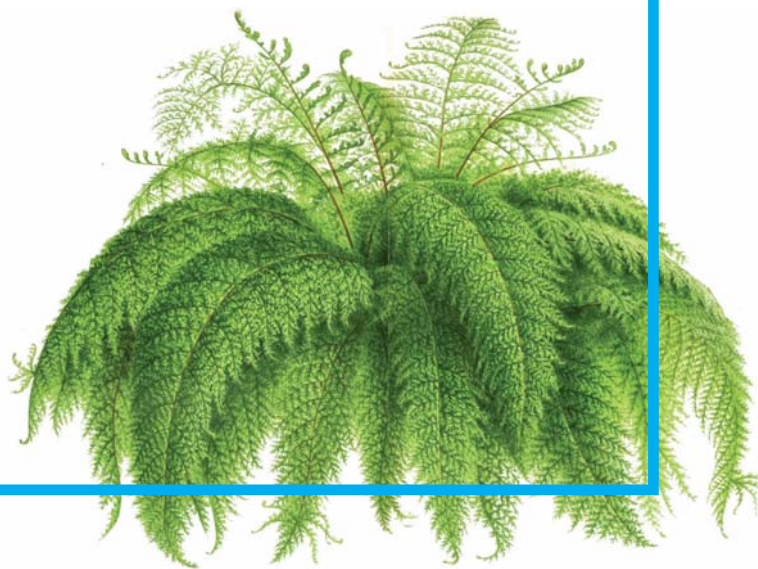


United Nations
Environment Assembly
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Environment Programme



1

Pollution matters



- 1 For too long, the relationship between prosperity and environment has been seen as a trade-off. Tackling pollution was equated to imposing costs on industry and curbing economic growth. Global trends are demonstrating that this is no longer the case. Increasingly, for anyone concerned about prosperity and the welfare of current and future generations, it has become clear that sustainable development is the only form of development that makes sense, including in financial and economic terms. Investing in green technologies is a strategy for long-term profitability and prosperity for all.
- 2 The energy revolution currently unfolding is a game changer, as is the increased mobilization and awareness around climate. The rapidly falling cost of energy from renewable sources, such as wind and solar power, means that the countries that lead the shift away from fossil fuels will reap the greatest economic and environmental benefits. Those countries will have better, faster transport networks and more flexible power grids. The electrification of transport offers the opportunity to combat climate change and curb air pollution, especially in rapidly growing cities, and will help to address one of the greatest threats to public health.
- 3 With the transition to green and sustainable development under way, we now need to focus on ways of facilitating the intensification and acceleration of these trends in order to protect the environment, combat climate change and curb pollution. Mobilizing finance at scale, green investments and circular and resource-efficient business models will drive more sustainable approaches to economic development and ways of living. Governments, businesses and citizens will be at the forefront of these efforts. The move towards a pollution-free planet provides an opportunity to innovate and become more competitive.
- 4 Just as compelling is the case for ensuring the supply of clean water and sanitation to every family on the planet. The human cost – in terms of reducing diarrhoeal diseases, malaria and other preventable diseases – is immeasurable. This alone makes the case for action overwhelming, and great efforts are already under way. The financial cost in terms of lost workdays and medical bills

* This report is a condensed version of the full-length report, *Towards a Pollution-free Planet*, which is available at <http://www.unep.org/assembly/backgroundreport>

for poorer families is also crippling. Locked into poverty, afflicted communities are a brake on the advancement of entire countries and regions.

- 5 Curbing pollution is vital to protecting the natural systems that not only underpin the livelihoods of billions of people, but also sustain all life on Earth. Biodiversity is under threat as never before. Animals and plants, including species vital to many poorer communities, are suffering from the effects of pollution, including from the vast amounts of untreated waste emanating from households and industry. The excessive use of fertilizers and pesticides in agriculture is having severe unintended impacts, decimating the populations of beneficial insects such as bees, destroying the ecosystems of rivers and lakes and creating hundreds of coastal “dead zones” devoid of fish.
- 6 Of course, pollution is not a new phenomenon – and nor is action to counter it. A substantial framework of international conventions and national laws has been constructed to tackle some of the harms and worst excesses. Notable successes include the ongoing repair of the ozone layer and the phasing out of numerous banned pesticides and chemicals.
- 7 There is, however, now a need – and an opportunity – to dramatically step up our ambition. Science is delivering great advances in our understanding of pollution and its impacts on people, economies and the environment. Citizens are more aware than ever before of how pollution affects their lives and they are demanding action. At the same time, experts and businesses are developing the technology to tackle these problems at all scales, from local to global. Financiers are increasingly ready to support them, while international bodies and forums, including the United Nations, stand ready to help to channel this momentum and turn it into firm action.
- 8 Concern about the impacts of pollution has already contributed to agreement being reached on two landmark accords: the Paris Agreement on climate change and the 2030 Agenda for Sustainable Development. Tackling pollution will make a crucial contribution to the successful implementation of both these accords.
- 9 The responsibility for driving change on this broad front is shared among and within nations. Government policies and programmes will play a central role, both nationally and internationally. Businesses, consumers, investors, community groups and thought leaders must also be fully involved if we are to succeed. Technology and economic innovation are key, as is mobilizing finance at scale. Investments and domestic savings need to be harnessed to address climate- and pollution-related challenges.
- 10 The present report examines the dimensions of pollution and identifies a way forward through a framework of policy action. The framework has both preventive and remedial aspects, for both the near term and the long term. It is based on opportunities and innovations that will lead us towards the goal of a pollution-free planet.
- 11 Five key messages underpin this framework of action:
 - a. Political leadership and partnerships: a global compact on pollution would ensure sustained engagement at the highest level and make prevention a priority for all. It would also encourage policymakers and other key partners, including the private sector, to integrate prevention into national and local planning, development processes, and business and finance strategies;
 - b. The right policies: environmental governance needs to be strengthened – with targeted action on “hard-hitting” pollutants through risk assessments and enhanced implementation of environmental legislation, including multilateral environmental agreements, and other measures;
 - c. A new approach to managing our lives and economies: sustainable consumption and production, through improved resource efficiency and lifestyle changes, should be promoted; waste reduction and management must be prioritized;
 - d. Investing big: mobilizing finance and investment in low-carbon opportunities and cleaner

production and consumption will drive innovation and help to counter pollution; increased funding is also needed for research, pollution monitoring, infrastructure, management and control;

- e. Advocacy for action: citizens need to be informed and inspired to reduce their own pollution footprint and advocate for bold pollution-beating commitments from the public and private sectors.

12 Tackling the pollution challenge is vital to securing human well-being. It is a critical insurance policy for current and future generations, the fulfilment of whose rights depends on a healthy environment. Special attention must be paid to the needs of women, the poor and the disadvantaged, many of whom depend on well-functioning ecosystems for their livelihoods. With enough political will, public support and business engagement, it is within our power to tackle pollution.

2

Pollution challenges



- 13 Pollution can be defined as the introduction of substances or energy into the environment with impacts that endanger human health, natural resources and ecosystems. It also impairs the use of the environment for work and recreation and threatens the cultural, spiritual and aesthetic values that many people attach to the richness and diversity of both natural and human-made environments.
- 14 Pollution has many causes. It can result from the choice of technology when making large investments, for example in industrial processes; the design of products and their packaging; the tastes and habits of consumers; a lack of regulation and enforcement; and ignorance of or disregard for the impacts of pollution on human health and ecosystems. Armed conflicts and industrial environmental accidents can also cause severe pollution and may dramatically reduce the ability of a country to manage pre-existing or emerging pollution issues.
- 15 Some forms of pollution have receded as a result of improvements in regulation, technology, public awareness and management. Others have been successfully targeted through global and regional agreements; the reduction in the production and use of ozone-depleting substances is one such example. Encouragingly, more Governments, industries and citizens are moving towards a circular economy, with the use of more sustainable materials, cleaner technologies and greater resource efficiency.
- 16 Nevertheless, pollution remains a huge challenge that threatens to intensify as a result of rising consumption and living standards and population growth. Pollutants, including human-made chemicals and emissions and domestic and industrial waste streams, are impairing the quality of the air that we breathe, the water that we drink, the soil in which we grow our food and the oceans on which millions depend for their livelihoods
- 17 The effects of pollution on human health and ecosystems are serious and widespread (see figure I). They are increasingly well understood thanks to intensive scientific research, and they are a pressing concern for billions of people around the world.
- 18 The World Health Organization has estimated, for example, that 23 per cent of all deaths worldwide – amounting to 12.6 million people in 2012 – are due to environmental causes, with at least 8.2 million attributable to non-communicable, environmental causes (see figure II). Low-income and middle-income countries bear the brunt of pollution-related illnesses, with a disproportionate impact on children.

Impacts of types of pollutants on human health and ecosystems	
 Air pollution 6.5 million people die annually as a result of poor air quality, including 4.3 million owing to household air pollution - Lower respiratory infections: household or ambient air pollution, including second-hand tobacco smoke, causes 52 million years of life lost or lived with disability annually - Chronic obstructive pulmonary diseases: household air pollution and workers' exposure cause 32 million years of life lost or lived each year with disability - Ground-level ozone pollution is estimated to reduce staple crop yields up to 26 per cent by 2030	 Marine and coastal pollution 3.5 billion people depend on the oceans as a source of food, yet oceans continue to be used as waste and wastewater dumps - There are close to 500 "dead zones", namely regions with too little oxygen to support marine organisms, including commercial species - Between 4.8 million and 12.7 million tons of plastic waste enter the ocean every year as a result of inadequate waste management
 Freshwater pollution 58 per cent of diarrhoeal disease (a major source of child mortality) is caused by a lack of access to clean water and sanitation - Poor water, sanitation, hygiene and agricultural practices causes 57 million years of life lost or lived with a disability annually - Over 80 per cent of the world's wastewater is released into the environment without treatment	 Chemicals - Over 100,000 people die annually from exposure to asbestos - Lead in paint affects children's IQ - Children poisoned by mercury and lead develop problems in their nervous and digestive systems and kidney damage - Many of the negative effects of chemicals are still to be fully assessed, including of endocrine disruptors and developmental neurotoxins and long-term exposure to pesticides on human health and well-being and biodiversity and ecosystems
 Land/soil pollution - Open waste dumps and burning affects lives, health and livelihoods, as well as soil chemistry and nutrition - Excessive exposure and inappropriate use of pesticides affects the health of all – men, women and children - Stockpiles of obsolete chemicals pose a threat to people's health and the environment	 Waste - The 50 biggest active dump sites globally affect the lives of 64 million people, owing to the risk to their health and of loss of lives and property when collapses occur 2 billion people do not have access to solid waste management and 3 billion lack access to controlled waste disposal facilities

Figure 1 Source: United Nations Environment Programme, Healthy Environment, Healthy People (Nairobi, 2016).

Available from <https://wedocs.unep.org/bitstream/handle/20.500.11822/17602/K1602727%20INF%205%20Eng.pdf?sequence=1&isAllowed=y>. For the complete list of references for this figure, please refer to the full-length report, Towards a Pollution-Free Planet

- 19 Some types of pollution are easily noticed, such as certain forms of contaminated water, poor air quality, industrial waste, litter, light, heat and noise. Others are less visible, for example the presence of pesticides in food, mercury in fish, nutrients in seas and lakes, substances that deplete the ozone layer and endocrine-disrupting chemicals in drinking water. Some forms of pollution, such as those coming from abandoned industrial sites, armed conflict zones, nuclear power stations, pesticide stockpiles and waste landfills, are part of a longer-term legacy.
- 20 While chemicals have many benefits for human society, they can also have significant harmful effects on people, other living organisms and ecosystems. Of the tens of thousands of chemicals on the market, relatively few have been thoroughly evaluated to determine whether they cause adverse effects on human health and the environment. In developed countries, waste generation nearly doubled between 1970 and 2000 and continues to increase.

- 21 There is a direct correlation between municipal solid waste per capita and national income levels.¹ Dump sites around the world are sources of complex pollution mixtures, with emissions of gases such as methane, leachate of heavy metals, electronic waste and hazardous waste all mixed together. It is estimated that the 50 largest active dump sites globally affect the lives of 64 million people, including their health and the risk of loss of life and property when landslides and collapses occur.² Poor people are especially vulnerable, given that the sites are often surrounded by informal settlements.
- 22 Waste is of particular concern to small island States. These countries, very often tourist destinations and ports of call for international shipping, are vulnerable to the waste that such activities generate. Given their climate vulnerability, limited land space and often-limited institutional capacity for pollution management, a weather-related event can swiftly lead to flooding. Unmanaged waste then becomes a health and ecosystem hazard.
- 23 Pollution can also have far-reaching political impacts by raising tensions between countries and communities. Transboundary pollution has led to deteriorating relationships between countries and several long-running, acrimonious legal disputes. In severe cases, anger over pollution has even contributed to the outbreak of armed conflict.
- 24 The four main areas of pollution are the following:
- Air pollution.** Mainly the result of the burning of fossil fuels, it is the world's single greatest environmental risk to health. Some 6.5 million people die prematurely every year from exposure to outdoor and indoor air pollution, and 9 in 10 people breathe outdoor air polluted beyond acceptable World Health Organization guideline levels. Air pollution disproportionately affects the most vulnerable, including those with mental disabilities. In addition to the impact on human health, air pollutants cause climate change and affect ecosystems. Key air pollutants include particulate matter, black carbon and ground-level ozone;
 - Land and soil pollution.** This is the product of poor agricultural practices, improper solid waste management, including unsafe storage of obsolete stockpiles of hazardous chemicals and nuclear waste, and a wide range of industrial, military and extractive activities. Leachates from mismanaged landfill sites and uncontrolled dumping of waste from households, industrial plants and mine tailings can contain heavy metals, such as mercury and arsenic, trace metals, organic compounds and pharmaceuticals, including antibiotics and microorganisms. Pesticides and antimicrobial drugs used in crop and livestock production are among the pollutants of most concern;
 - Freshwater pollution.** Freshwater bodies, on which billions of people depend for water, food and transport, are heavily affected by nutrient run-off from agriculture, chemicals and pathogens in untreated wastewater, heavy metals from mining and industrial effluents. Lack of access to clean water and sanitation is a major cause of child mortality. Pollution can have a serious impact on fish and other biodiversity in sensitive freshwater ecosystems such as rivers, lakes and wetlands, and polluted freshwater can go on to contaminate land and soil and coastal waters. It hosts disease vectors such as cholera-causing *Vibrio* bacteria and the parasitic worms that transmit schistosomiasis;

¹ Daniel Hoornweg and Perinaz Bhada-Tata, "What a waste: a global review of solid waste management", Urban Development Series Knowledge Papers, No. 15 (Washington, D.C., World Bank, 2012). Available from <https://openknowledge.worldbank.org/bitstream/handle/10986/17388/68135.pdf?sequence=8&isAllowed=y>.

² Waste Atlas Partnership, *Waste Atlas: The World's 50 Biggest Dumpsites – 2014 Report* (2014). Available from www.d-waste.com/d-waste-news/item/263-the-world-s-50-biggest-dumpsites-official-launching-of-the-2nd-waste-atlas-report.html

- d. **Marine and coastal pollution.** Marine and coastal waters receive waste and pollutants, including debris, oil, heavy metals and radioactive waste, from land-based sources and from the marine shipping, fishing and extractive industries. Nutrients from agriculture are causing “dead zones” in coastal waters, harming local fisheries. Persistent organic pollutants, including pesticides, threaten coral reefs and seagrass beds. They accumulate in the marine food chain, posing a risk to birds, mammals and people, including indigenous peoples in the Arctic region. Millions of tons of plastic waste are entering and spreading through the oceans every year, posing risks to ecosystems and human health that are not yet fully understood.

Number of deaths in 2012 attributable to environmental factors, by World Health Organization region

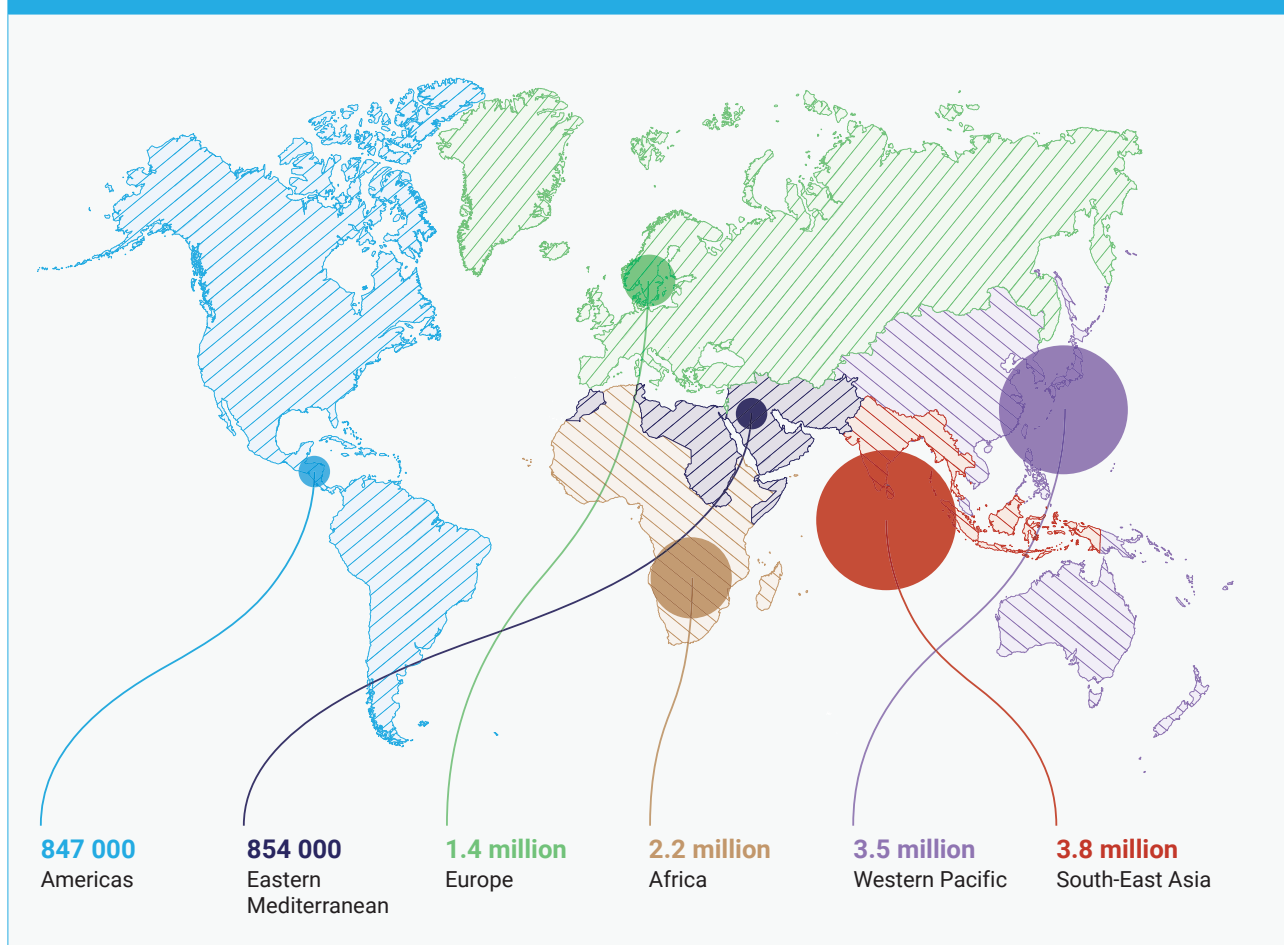


Figure II Source: A. Prüss-Ustün and others, *Preventing Disease through Healthy Environments: A Global Assessment of the Burden of Disease from Environmental Risks* (Geneva, World Health Organization, 2016). Available from www.who.int/quantifying_ehimpacts/publications/preventing-disease/en/.

Economic case for action

- 25 Pollution has significant economic costs from the point of view of productivity losses, health-care costs and ecosystem damages. In 2013, the global welfare costs associated with air pollution were estimated at some \$5.11 trillion. The welfare costs from mortality relating to outdoor air pollution were estimated at about \$3 trillion; for indoor air pollution, the figure was \$2 trillion. Declining water quality also has a wide range of economic impacts in relation to human health, ecosystem health, agricultural and fisheries productivity and recreational uses. With regard to human health, the welfare cost of mortality from unsafe water is considerable in many developing countries. In 2004, losses stemming from inadequate water and sanitation services in developing countries were estimated at \$260 billion per year – the equivalent of 10 per cent of gross domestic product (GDP) for some poor countries. One study found that, for 42 countries in Africa, land degradation was costing an estimated 12.3 per cent of those countries' GDP.
- 26 These are conservative estimates, given that not all pollutants and waste are included. While they are only indicative of the scale of pollution impacts, they nevertheless underpin the clear-cut case for immediate action.
- 27 The already substantial economic costs of pollution are expected to rise over time as a result of the direct effect of pollution on health and the associated impact of weakened livelihoods, particularly in rural areas, as well as the longer-term effect on ecosystem services that, in turn, affect local communities, societies and economies.
- 28 The flip side to the costs of pollution is the benefits of action to tackle pollution. The eminently achievable goal of reducing pollution generates significant economic savings or gains that can catalyse a virtuous cycle of inclusive green development. Although data are not widely available, the global benefits of pollution intervention are significant – even if only the effects of measures to control air and water pollution are considered – in addition to the benefits already seen from reducing the use of ozone-depleting substances, lead and mercury.
- 29 A move to less-polluting and nature-based technologies also offers economic and employment opportunities. Renewable energy provided jobs for 9.8 million people worldwide in 2016,³ compared with 5.7 million in 2012.⁴ Economic opportunities, including jobs, are also provided by waste recycling and reuse. Innovation in the chemicals sector opens up new ways of using existing resources at a lower cost or more productively through the development of safer alternatives to those currently in use. Forecasts indicate that total savings across industry from developments in green chemistry could reach \$65.5 billion, representing a market opportunity worth some \$100 billion by 2020.⁵
- 30 The 2030 Agenda provides businesses with an opportunity to respond to the Sustainable Development Goals and to act on pollution. The Business and Sustainable Development Commission, in its 2017 report,⁶ identifies at least \$12 trillion worth of opportunities, with the 60 greatest opportunities in the areas of food and agriculture, cities, energy and materials and health and well-being. Many of these opportunities can help to mitigate pollution and to reduce, recycle, recover and remake products and materials.

³ International Renewable Energy Agency, *Renewable Energy and Jobs: Annual Review 2017* (Abu Dhabi, 2017). Available from www.irena.org/DocumentDownloads/Publications/IRENA_RE_Jobs_Annual_Review_2017.pdf.

⁴ International Renewable Energy Agency, *Renewable Energy and Jobs* (Abu Dhabi, 2013). Available from <http://irena.org/REJobs.pdf>.

⁵ Pike Research, "Green chemistry: biobased chemicals, renewable feedstocks, green polymers, less-toxic alternative chemical formulations, and the foundations of a sustainable chemical industry", *Industrial Biotechnology*, vol. 7, No. 6 (January 2012), pp. 431-433.

⁶ Business and Sustainable Development Commission, *Better Business, Better World* (London, 2017). Available from http://report.businesscommission.org/uploads/BetterBiz-BetterWorld_170215_012417.pdf.

3

Tackling pollution



Existing initiatives

- 31 In response to the serious and growing impacts of pollution and its cross-border nature, Governments have entered into targeted multilateral or regional environmental agreements aimed at addressing aspects of the threat. Together with resolutions adopted by the United Nations Environment Assembly and in other international forums, these agreements constitute a governance structure on which the framework of action on pollution proposed herein can build.
- 32 Specific pollution-focused agreements include the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the Stockholm Convention on Persistent Organic Pollutants; the Convention on Long-range Transboundary Air Pollution, which addresses issues including acid rain; and the Montreal Protocol on Substances that Deplete the Ozone Layer, which is helping to reverse the depletion of the ozone layer and thus protect people, plants and animals from harmful solar radiation. The Minamata Convention on Mercury, which entered into force on 16 August 2017, addresses pollution at the nexus of environment and health.
- 33 By prompting many countries to target sharp cuts in emissions of greenhouse gases from the burning of fossil fuels, the Paris Agreement on climate change is a major step forward in tackling air pollution and global warming.
- 34 The Convention on Biological Diversity's Aichi Biodiversity Targets call for a decrease in pollution to slow the decline in global biodiversity. The coastal and freshwater

The Convention on Biological Diversity's Aichi Biodiversity Targets call for a decrease in pollution to slow the decline in global biodiversity. The coastal and freshwater pollution that affects several countries is addressed primarily through regional initiatives, including regional seas conventions and action plans.

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- 35 In response to these and other agreements, most countries have adopted national policy and legal frameworks that address pollution (see figure III).

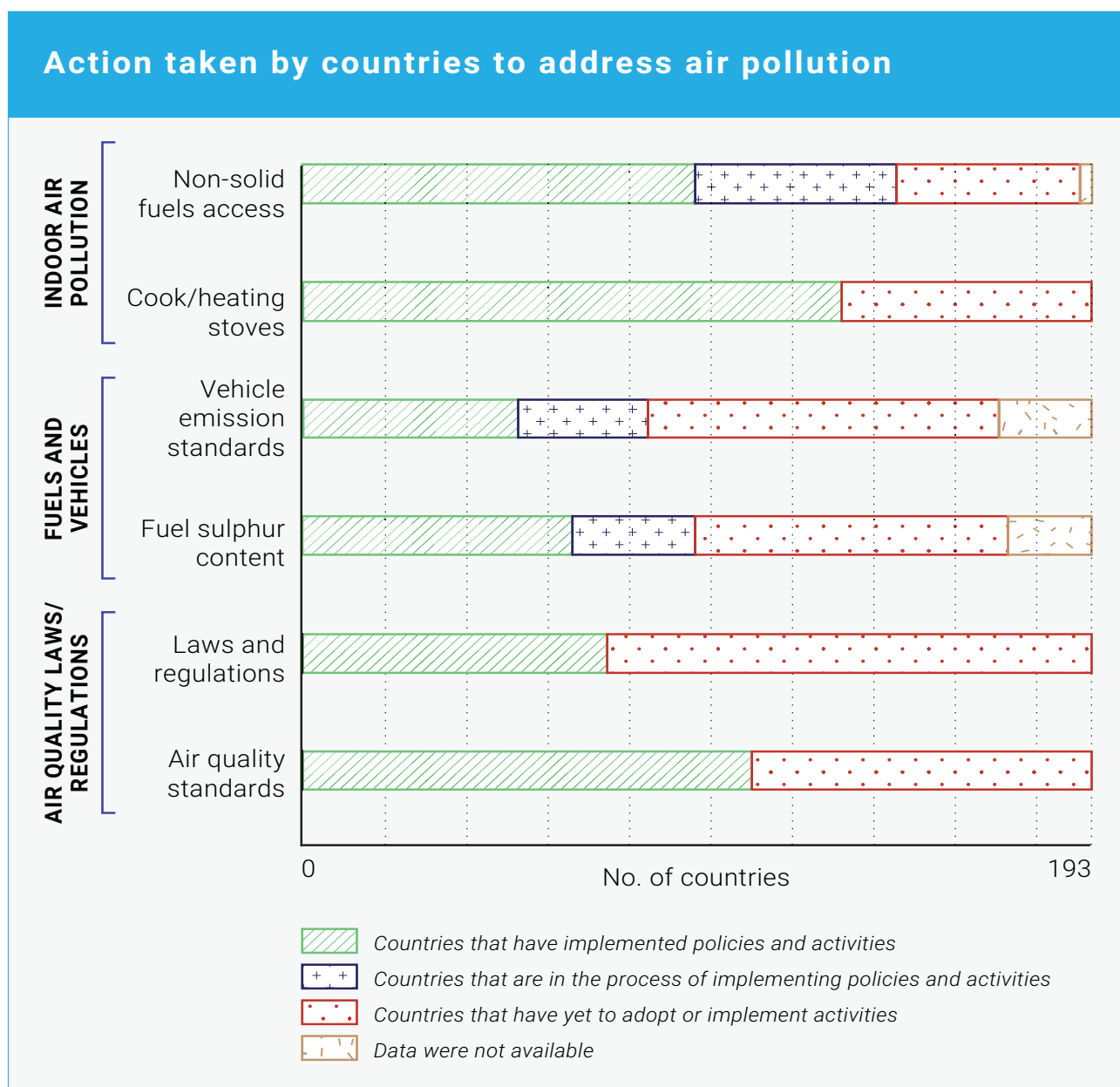


Figure III Source: United Nations Environment Programme, "Actions on air quality: policies and programmes for improving air quality around the world" (Nairobi, 2016). Available from https://wedocs.unep.org/bitstream/handle/20.500.11822/17203/AQ_GlobalReport_Summary.pdf?sequence=1&isAllowed=y.

- 36 One hundred and sixty-seven countries have national legislation addressing the issues covered by the Basel Convention. Of these, 142 have specific chemicals or waste legislation. As at 2015, more than 100 countries guaranteed their citizens the right to a healthy environment. As at 2015, 109 countries had air quality standards; 73 had a specific air quality policies, acts or rules; and 104 had vehicle emission standards (see figure III).

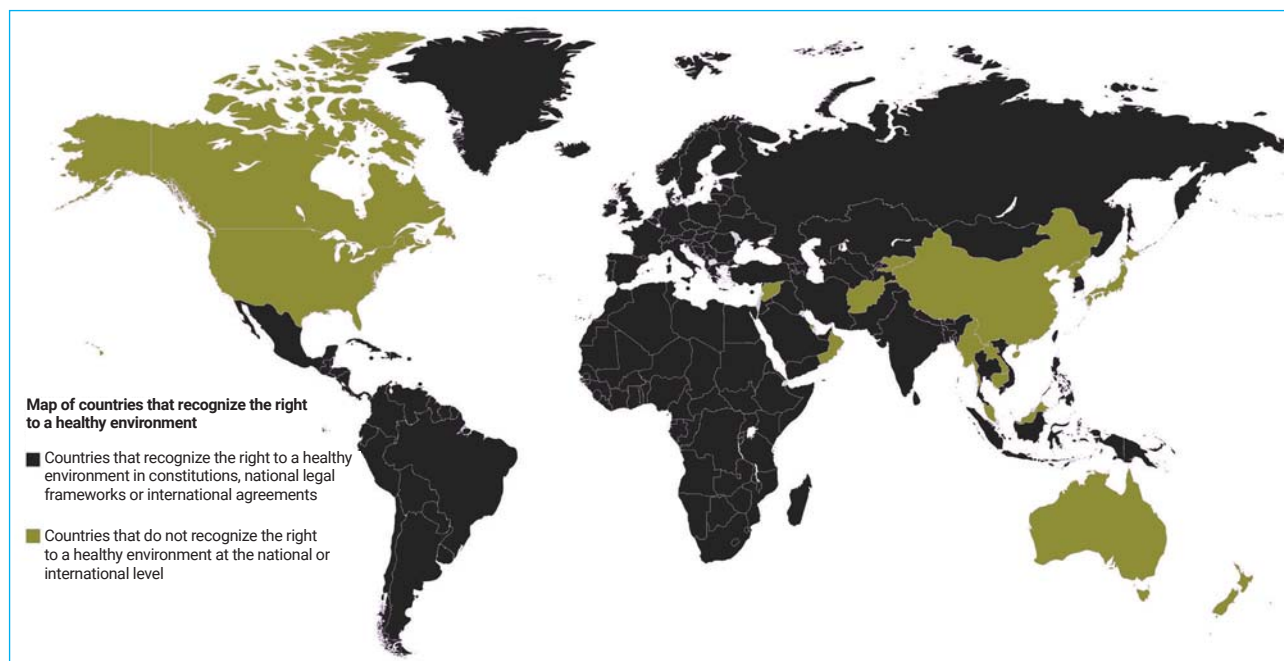


Figure IV Recognition of the right to a healthy environment by country. Note: Map updated on the basis of D.R. Boyd, *The Environmental Rights Revolution: A Global Study of Constitutions, Human Rights, and the Environment* (Vancouver, UBC Press, 2012).

- 37 Voluntary initiatives and global alliances, such as the Strategic Approach to International Chemicals Management, the Climate and Clean Air Coalition and the Partnership for Clean Fuels and Vehicles (see figure V), have also pushed forward action on pollution. Urged on by non-governmental groups, many businesses have become champions of change, reducing pollution at source and adopting innovative ways of producing goods and services.
- 38 Global and regional agreements cover only a part of the governance landscape, however, and more action at the national and regional levels is required to tackle local, national and global pollution.

Challenges and gaps

- 39 While successful responses to pollution exist, their scope, scale and effectiveness are limited. Many multilateral environmental agreements are not as effective as they could be, owing to a lack of institutional capacity or resources. Moreover, in some cases, even where there is scientific evidence of risk from a chemical or material to health or ecosystems, the necessary global or national policy action is yet to be developed. In other cases, emerging evidence of risk is not considered sufficient to justify action.

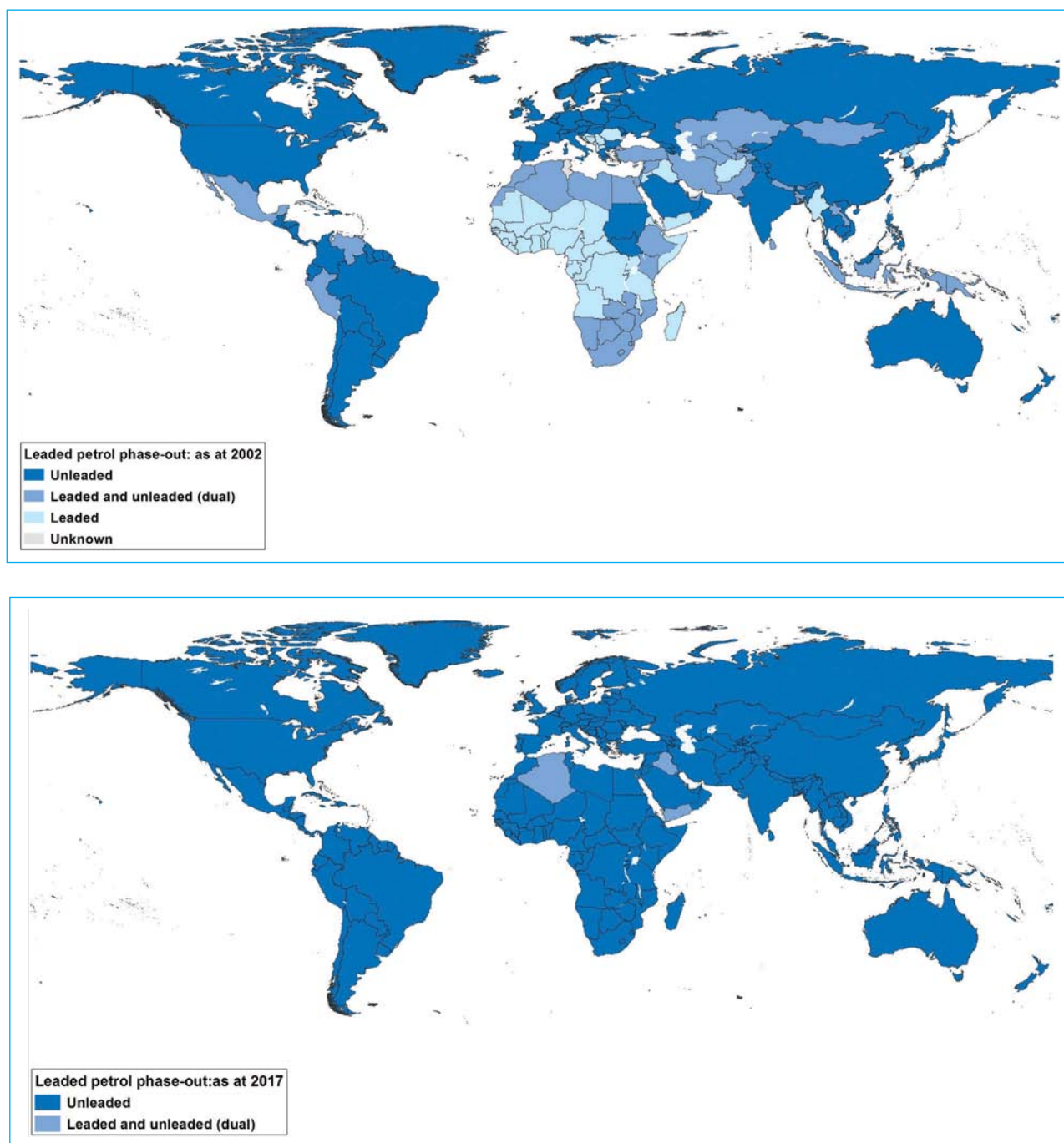


Figure V Leaded petrol phase-out: global status as at end 2002 (top) and March 2017 (bottom)

- 40 Another factor hindering effective action on pollution is the absence of property rights or enforceable rights on the environment. This often results in the ocean, the atmosphere and open land being treated as dumping grounds.
- 41 There remain significant gaps in the struggle against pollution:
- a. **Implementation gaps.** These often arise because of a lack of resources, inadequate administrative, financial, institutional and technical capacity or the absence of political will or interministerial coordination;
 - b. **Knowledge gaps.** These persist owing to inadequate awareness of key information, including the sources of pollution, pathways of exposure, impacts and solutions. New findings on the effects on health and ecosystems and emerging issues need to be taken into account. There is insufficient disclosure of information and a limited understanding of pollution's social and gender dimensions;
 - c. **Infrastructure gaps.** These exist, for example, when it comes to monitoring pollution, collecting, treating and disposing of waste, wastewater and mine tailings, facilitating recycling and improving food storage;
 - d. **Limited leadership by financial institutions and industry.** This is especially acute in the areas of pollution information disclosure, due diligence, internalization of pollution costs, pollution prevention and green financing and is hindering effective action;
 - e. **Mispricing, the invisibility of ecosystem values and the externalization of pollution costs.** These have resulted in wastage and overuse of resources, the treatment of ecosystems as dumps and sinks for waste, and choices being made without full awareness of the environmental consequences;
 - f. **Insufficient recognition that consumer choices have pollution consequences.** Such choices, made even when appropriate regulations and policies exist, suggest the need for better understanding of behaviour and incentives. Choices can be made out of habit, a feeling that one person cannot make a difference, a free-rider problem, peer pressure or the lack thereof, social norms and practices and the absence of information on products and alternative affordable options.⁷

2030 Agenda for Sustainable Development: an opportunity to act

- 42 The 2030 Agenda provides an opportunity to accelerate action on pollution and thus help to achieve the Sustainable Development Goals, as shown in figure VI. This is an opening for Governments to take regional, national and local action on pollution that puts them on a path to meeting the Goals.
- 43 The 2030 Agenda also provides businesses, communities and citizens with an opening to act on pollution. The Business and Sustainable Development Commission, in a recent report,⁸ identifies business opportunities that could be worth more than \$12 trillion annually by 2030. Many of these opportunities will be important in helping to mitigate pollution, reduce waste and boost the recovery and recycling of materials globally.

⁷ United Nations Environment Programme, *Consuming Differently, Consuming Sustainably: Behavioural Insights for Policymaking* (Nairobi, 2017). Available from <https://sustainabledevelopment.un.org/content/documents/2404Behavioral%20Insights.pdf>.

⁸ Business and Sustainable Development Commission, *Better Business, Better World*

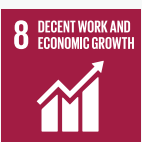
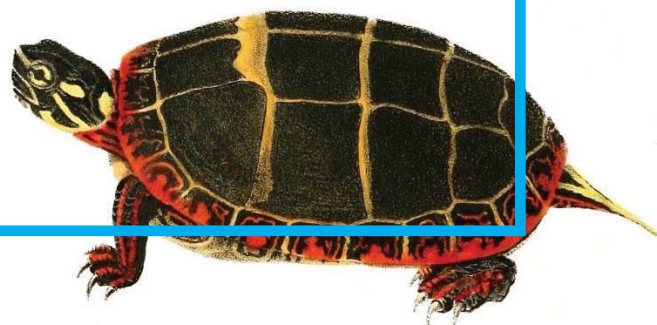
Acting on the Sustainable Development Goals			
	Cleaner environments improve worker health and productivity		Growing food in non-contaminated soil helps to fight hunger and ensure the provision of safe food
	Action on pollution substantially reduces the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination		A clean environment promotes high-quality education, which enables the acquisition of the knowledge and skills needed to promote sustainable development and sustainable lifestyles
	Pollution reduction promotes equality, for example by reducing the burden of fetching clean water and exposure to indoor air pollution		Better-managed freshwater ecosystems and cleaner water significantly reduce the number of deaths from diarrhoeal diseases
	Access to affordable, reliable, sustainable and modern energy can cut indoor air pollution, which will particularly benefit women and children		Reduced exposure to pollution leads to improved health and well-being of workers and therefore increased productivity and economic growth
	Pollution avoidance through the adoption of green technologies and ecosystem-based solutions fosters innovation and sustainability in industry and infrastructure		Pollution governance and action can ensure that no group or community is made to bear a disproportionate share of the harmful effects of pollution
	Sustainable transport, waste management, buildings and industry lead to cleaner air in cities		Resource efficiency and circularity in materials and input use reduce pollution and waste and contribute to sustainable consumption and production
	Clean energy and low-carbon policies reduce air pollution and mitigate climate change impacts		Action on marine pollution reduces potential bioaccumulation of toxic substances as well as habitat destruction, and helps to maintain healthy fisheries and ecosystems
	Integrating ecosystem and biodiversity values into policies, development plans and poverty reduction strategies supports improved land management and avoids dumping and other forms of pollution		Good pollution-related governance reduces environmental burdens and injustices and can enhance the availability of resources for the underserved
	Global partnerships to address pollution can have positive impacts on human health and well-being, job creation and worker productivity, in addition to environmental benefits		

Figure VI Source: United Nations Environment Programme, Acting on the Sustainable Development Goals

4

Towards a pollution-free planet: a framework for action



- 44 A framework for action can guide the transition towards a pollution-free planet. The framework must be broad and founded on strong science to ensure that burdens and negative effects are not simply shifted from one area to another. It also needs to be system-wide, preventive and remedial, taking into account the near term and the longer term.

It must embrace opportunities to clean up the environment, foster innovation and improve human productivity and efficiency, and must reinforce integration and coherence in the way that society responds to the social, environmental and economic challenges relating to pollution. The framework for action should recognize the need to build on what Governments and stakeholders have already achieved and reproduce it in other settings by sharing, supporting and adopting good practices.

- 45 The framework will require political leadership and high-level champions and commitments for action at all levels – from the global to cities, villages, rural and coastal communities and informal settlements. Tracking the progress of action to tackle pollution will be crucial. Sharing widely examples of action that worked, how it can be applied and the benefits that it brings in other settings is also key to sustaining momentum.
- 46 Member States and other stakeholders may wish to consider the proposed framework for action on pollution set out herein. The framework is centred on a dual track of action:
- Targeted interventions.** These are based on risk assessments and scientific evidence of the effects of pollution and seek to address “hard-hitting” pollutants and the four key areas of pollution (air, water, marine and coastal and land/soil), including the cross-cutting categories of chemicals and waste;
 - System-wide transformations.** These are aimed at greater resource efficiency and equity, circularity and sustainable consumption and production and improved ecosystem resilience to support cleaner and more sustainable development.

- 47 The dual track is guided and underpinned by the two additional key elements of the framework:
- Principles of universality, sustainability, integration, precaution and inclusiveness.** These are drawn from the Rio Declaration on Environment and Development and the 2030 Agenda.
 - Enablers.** Also known as broader supporting actions, they aim to shift incentives, correct market and policy failures and address some of the gaps and issues that make pollution so pervasive and persistent.

Enablers

- 48 Enablers facilitate transformative action that can drive a preventive pollution agenda. They support the targeted interventions and system-wide economic transformations outlined below. Key enablers include:
- Balancing evidence-based decision-making and precautionary approaches that improve environmental governance at the global, national and regional levels by:
 - Enhancing regulatory, enforcement and judiciary capacity;*
 - Bringing about regulatory and public policy innovation;*
 - Mainstreaming preventive approaches;*
 - Cultivating a culture of compliance to support active citizen participation;*
 - Further encouraging citizen participation through effective environmental information systems based on data gathering, monitoring and open access;*
 - Establishing economic instruments based on proper pricing of resources; introducing fiscal incentives to stimulate systemic and behavioural changes to prevent and reduce pollution; and implementing pollution charges and fees;
 - Investing in education for change;
 - Strengthening cooperation and partnerships to promote change and action on pollution.
- 49 More details of the enablers can be found in the full-length report, *Towards a Pollution-Free Planet*.

Targeted interventions

Targeting “hard-hitting” pollutants

- 50 The first track of the framework for action targets specific forms of pollution, including especially harmful “hard-hitting” pollutants. These pollutants can be grouped into three categories (see table 1).
- 51 The first category comprises substances already addressed through relevant multilateral environmental agreements, but where implementation and enforcement should be strengthened and scaled up. Examples include persistent organic pollutants, such as the pesticides, flame retardants and other hazardous chemicals covered by the Basel, Stockholm and Rotterdam conventions. Mercury, which is addressed through the Minamata Convention, is another. Examples of action that could be taken include identifying alternatives to the specified pollutants, providing additional financing to efforts to curb risk, building capacity and encouraging industry support.
- 52 The second category is those pollutants for which scientific evidence is sufficient to justify new intervention to reduce the risk that they pose. Examples include some heavy metals, phosphorus and nitrogen, particulate matter and sulphur dioxide. Possible action includes establishing and enforcing new emissions standards, deploying best practices and technologies in industry and improving chemical labelling schemes.
- 53 The third category comprises substances for which the emerging scientific evidence of the nature and magnitude of their risk to human health and the environment points to the need for

further investigation and better understanding of those risks. Such substances include endocrine disruptors (chemicals that affect the hormonal system in humans and animals) and antimicrobials, which, if released into the environment, may foster drug resistance. There is a need to step up research into and build understanding of the potential risks of these substances, especially in developing countries.

Targeting areas of pollution and cross-cutting pollution

- 54 In addition to targeting specific hazardous substances, many interventions can help to tackle or prevent particular forms of pollution at the local, national or regional level. Many such forms are already covered by multilateral environmental agreements or other initiatives, while others are new and based on emerging knowledge. Several are also interlinked. Nutrient pollution from land-based sources, for example, also significantly affects freshwater and marine environments. It is therefore important to use river basin or ecosystem approaches to control and manage pollution flows. Fifty policy options for action to address air, water, land/soil, marine and coastal, and chemicals and waste pollution are summarized below:

Types of action required per category of pollutant, based on scientific evidence		
 Chemicals/pollutants	 Scientific evidence	 Objective/focus of action
• Persistent organic pollutants, under Stockholm Convention (e.g. polychlorinated biphenyls (PCBs); polybrominated diphenyl ethers (PBDEs); dichlorodiphenyltrichloroethane (DDT); endosulfan) • Ozone-depleting substances, under the Montreal Protocol • Mercury, under the Minamata Convention • Asbestos, under the ILO Asbestos Convention, 1986 (No. 162)	International pollution reduction action already agreed (mainly through multilateral environmental agreements)	• Need to scale up implementation action (through, for example, identification of alternatives, financing, strengthening institutional and technical capacity, compliance assistance teams and industry support) • Countries that are parties to multilateral environmental agreements (including the Basel, Rotterdam and Stockholm conventions, the Protocol to the 1979 Convention on Long-range Transboundary Air Pollution on Persistent Organic Pollutants and the Minamata Convention) must ensure full implementation of and compliance with those agreements
• Highly hazardous pesticides • Phosphorus and nitrogen • Lead • Other heavy metals (cadmium, arsenic, chromium) • Environmentally persistent pharmaceutical pollutants • Chemicals included under the Rotterdam Convention • Selected solvents (e.g., trichloroethylene) • Vinyl chloride/polyvinyl chloride • Certain fluorinated compounds (e.g., perfluorooctane sulfonic acid (PFOS)) • Selected flame retardants • Particulate matter (PM_{2.5} – PM₁₀) • Black carbon • Sulphur dioxide • Nitrogen oxides	Scientific evidence exists to advance action on risk reduction	• Enforce emission and release standards already in place or establish standards if none exist • Apply best available techniques and best environmental practices • Identify and promulgate further appropriate risk reduction measures at the national and international levels (measures may include bans, restrictions, standards, labelling and economic incentives), including full implementation of the Globally Harmonized System for Classification and Labelling of Chemicals • Improve resource efficiency and sustainability in production methods to increase the recycling and reuse of material where feasible and in accordance with international, regional and national requirements (e.g., for catalysts and solvents) • Implementation of the Protocol to the 1979 Convention on Long-range Transboundary Air Pollution on Heavy Metals • Strengthen the multilateral processes that complement multilateral environmental agreements or catalyse actions (e.g., on the Strategic Approach to International Chemicals Management, the Climate and Clean Air Coalition, the Climate Technology Centre and Network, the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns and the Lead Paint Alliance)
• Endocrine-disrupting chemicals • Nanotechnology • Neonicotinoids • Certain pharmaceuticals, such as antibiotics	Emerging scientific evidence concerning risk to human health and environment	• Need to scale up research and knowledge-sharing to better understand the nature and magnitude of risks, in particular in developing countries • Apply a precautionary approach

Table 1 Types of action required per category of pollutant, based on scientific evidence

1

Air pollution

1. Develop air quality policies and strategies at the subnational, national and regional levels to comply with World Health Organization air quality guidelines
2. Invest in air quality monitoring networks, assessment systems, institutional capacity and information disclosure to the wider public in order to address gaps in capacity, data, information and awareness
3. Reduce emissions from major industrial and manufacturing sources
4. Adopt and enforce advanced vehicles emissions standards
5. Develop and adopt electric and hybrid vehicles
6. Provide access to public transport and non-motorized transport infrastructure in cities
7. Increase investment in renewable energy and energy efficiency
8. Improve access to clean cooking fuels and green technologies for residential heating
9. Protect and restore ecosystems to avoid erosion, fires and dust storms
10. Reduce emissions of ammonium and methane from agriculture
11. Designate and expand green spaces in urban areas
12. Enhance climate change activities of Governments and businesses to better tackle local and regional pollution

2

Water pollution

13. Increase treatment, recycling and reuse of wastewater to reduce the amount of untreated wastewater discharged into freshwater bodies by at least 50 per cent by 2030
14. Adopt and enforce national guidelines for freshwater ecosystem management to protect and restore wetlands and other natural systems that contribute to water purification
15. Establish, improve and harmonize (in situ) water quality and quantity (flow) monitoring systems in surface water and groundwater
16. Define national and water-body standards to provide an ongoing picture of the quality of available water resources and to identify opportunities and risks in relation to human and ecosystem health
17. Improve data collection and sharing, build capacity for data quality assurance and control and make information on water quality freely available to the public
18. Provide safe drinking water and access to sanitation for all by 2030

3

Land and soil pollution

19. Adopt agroecological practices and integrated pest management and establish guidelines for the reduction and efficient use of fertilizers and environmentally friendly pesticides in agriculture
20. Reduce point-source pollutants, such as heavy metals from industry, and diffuse pollutants including pesticides and inefficiently used fertilizers in agriculture
21. Reduce the use of antimicrobials, including antibiotics in the livestock sector, to avoid unintended releases into the environment and food chain, and increase public awareness and international collaboration on research and product development
22. Invest in building the knowledge of all those associated with the design, construction, operation and closure of tailings dams
23. Remediate contaminated sites
24. Invest in long-term environmental monitoring following industrial closures

4

Marine and coastal pollution

25. Do not discharge untreated wastewater and reduce excess nutrient run-off from agricultural systems into the marine environment
26. Restore and conserve coastal ecosystems and wetlands to reduce the amount of excess nutrients and other pollutants such as heavy metals entering coastal and marine environments
27. Prevent and reduce marine litter, including microplastics, and harmonize monitoring and assessment methodologies to facilitate the adoption of reduction targets
28. Reduce or phase out the use of certain types of plastic (e.g. microbeads, packaging, single-use plastics) and promote their recovery
29. Develop efficient governance frameworks and strategies for the prevention and minimization of the generation of marine plastic litter, in particular from land-based sources, and make producers more responsible for the sustainable design, recovery, recycling and environmentally sound disposal of their products
30. Regulate the leaking of radioactive waste into the ocean
31. Establish waste collection systems in coastal areas and monitor programmes for marine litter to inform upstream interventions

5

Chemicals and waste

32. Adopt sound chemicals management and advance sustainable chemistry within business approaches, policies and practices
33. Improve the enforcement of existing regulations on the transboundary movement of hazardous waste, in particular toxic waste streams from developed to developing countries
34. Increase efforts to deploy locally safe, effective, affordable and environmentally sound alternatives to chemicals of concern, including DDT (dichlorodiphenyltrichloroethane), PCBs (polychlorinated biphenyls), asbestos, lead and mercury
35. Accelerate the implementation of the Basel, Rotterdam and Stockholm conventions, the Minamata Convention and the Strategic Approach to International Chemicals Management in a coordinated manner at the national level
36. Establish and strengthen pollutant release and transfer registers (PRTRs) to measure progress and provide baseline data on chemical emissions
37. Provide reliable and effective consumer information on the impacts of consumer products throughout their life cycles
38. Introduce eco-labelling schemes
39. Introduce producer responsibility schemes to collect, treat and safely recycle waste from production and consumption
40. Improve knowledge relating to chemicals in products throughout their life cycle (production, use, consumption and disposal)
41. Extend product lives
42. Reduce exposure to lead from battery recycling, pottery, ammunition, paint and contaminated sites
43. Phase out mercury use in a number of specific products by 2020 and manufacturing processes by 2025, and phase down use in dental amalgams and mining
44. Phase out the production and use of asbestos and ensure its sound disposal
45. Accelerate efforts to eliminate PCBs (polychlorinated biphenyls) to meet the Stockholm Convention deadlines for phasing out the substances by 2025 and disposing of them completely by 2028
46. Increase publicly available information and monitor data on the presence of chemicals in the environment, in humans and in pollution hotspots
47. Minimize the generation of waste, and improve its collection, separation, reuse, recycling, recovery and final disposal through policy frameworks and regulations at the national and subnational levels
48. Eliminate uncontrolled dumping and open burning of waste
49. Increase material and energy recovery of waste, including through recycling
50. Reduce food waste throughout value chains, including at the consumer level

System-wide action to transform the economy

Building circularity and resource efficiency into production processes and supply chains

- 55 Production and supply chains need to be circular, responsible and focused on the three Rs – reduce, reuse and recycle. Where waste is produced, it should be regarded as a resource, an investment and an employment opportunity. This requires applying a life-cycle approach across the value chain to ensure the efficient use of natural resources in ways that prevent pollution and strengthen the economy. Seeking to remove toxic chemicals from materials is part of this.
- 56 Across the world many such approaches are evident: the focus on sustainable materials management and resource efficiency in the United States of America; the promotion in Japan of a sustainable materials society and the three Rs; and the circular economy approaches used in the European Union, China and, increasingly, elsewhere. The transition requires much more knowledge and data about environmental conditions and trends, the effects of pollution and the use of natural resources at different levels of society. Life-cycle approaches should inform resource efficiency decisions.
- 57 Table 2 provides examples of action that can be taken at every stage of the production process or supply chain of any sector to prevent, better manage or reduce pollution in key economic sectors.
- 58 The market for environmental goods and services, including pollution control, is expected to grow to more than \$2.2 trillion by 2020. Opening markets for these goods and services will allow international trade and investment, stimulate innovation, reduce costs and make pollution technologies more accessible to developing countries. Ecosystems can be harnessed to provide many pollution control and management services.

Creating incentives to redirect finance and investments to less-polluting economic activities

- 59 Finance and financial institutions (national and international, public and private, traditional and more innovative) have an important role to play in preventing, mitigating and reducing the impact of pollution. This can be done in the following ways:
- Internalizing the costs of pollution in financial decisions and seeking to create positive impacts;⁹
 - Disclosing the costs and risks of pollution and performing impact-sensitive due diligence;
 - Reorienting finance away from polluting companies and activities and towards greener technologies;¹⁰
 - Preventing, reducing and managing risk¹¹ through insurance pricing and risk research and analytics, catastrophe risk models and loss prevention;
 - Working with multilateral development banks to ensure compliance with their own pollution management and control standards;
 - Catalysing larger investments with multiple benefits.

⁹ United Nations Environment Programme Finance Initiative, “The principles for positive impact finance: a common framework to finance the Sustainable Development Goals” (Geneva, 2017). Available from www.unepfi.org/wordpress/wp-content/uploads/2017/01/POSITIVE-IMPACT-PRINCIPLES-AW-WEB.pdf.

¹⁰ See, among others, www.green-invest.org/ and www.unepinquiry.org/publication/green-finance-progress-report/. Also see work on green bonds as a solution (www.unepinquiry.org/publication/scaling-up/) and on enhancing environmental risk analysis, including a case study on pollution stress testing in China (www.unepinquiry.org/g20greenfinancerepositoryeng/).

¹¹ It is worth noting important examples of action taken by insurance companies on pollution. All these insurers are signatories to the principles for sustainable insurance (see www.unepfi.org/psi/).

Examples of actions to prevent, better manage and reduce pollution in key economic sectors

Food and agriculture systems	Extractives (liquid (oil), gaseous and solid/mineral reserves)	Transport sector	Buildings and construction sectors
Incentivizing the uptake of more sustainable, climate-smart and agroecological production systems and technologies at the farm and landscape levels - Recalibrate current subsidies to reward good/sustainable agricultural on-farm practices rather than perpetuating bad practices - Adopt the integrated landscape approach, which follows the principles of ecosystem management, sustainable land and water use, reducing the footprint and building the resilience of farming systems and increasing diversity - Apply the principle of minimum harm in using pesticides, managing pests, weeds and disease and good on-farm chemical input management, including through use of personal protective equipment, storage and disposal of containers.	The extractives/materials/mining sector needs to lower its overall footprint and ensure that best standards and practice becomes normal practice: - Minimize waste, reduce pollution of air, soil and water and reduce resource use during production - Address resource scarcity and stranded assets by providing more accurate scenarios on demand and supply that are ecologically viable and integrate societal needs and constraints - Promote best available technology in the production chain, including for methane pollution reduction, water use and tailings - Reduce, and where feasible, eliminate mercury use in artisanal and small-scale gold mining - Ensure the safe management of chemicals (notably cyanide) that are produced, transported and used for the recovery of ores and on mill tailings and leach solutions - Support investment and research into new mineral extraction technologies to maximize efficiency, reduce the consumption of water, minimize waste and ensure the safety of tailings storage facilities and waste disposal methodologies	- Develop national road maps for only electric vehicles – from 2030, all new vehicles to be added should be electric, by 2050 the entire global fleet should be electric - As technologies further develop and become less expensive, heavy-duty transport, trucks, and aircraft need to switch to electricity - Adopt cleaner vehicle emission standards (Euro 6 level) - Adopt cleaner fuels standards, including eliminating leaded petrol and introducing low sulphur fuels of not more than 50 parts per million (aiming ultimately at 10 parts per million)	- In all countries, minimize the environmental impact of construction and operation of buildings through the application of life-cycle approaches and sustainable building policies - Apply resource efficiency and energy efficiency as guiding principles in policies, building design and in operations and maintenance - Reduce toxicity of building materials and on-site construction processes, including demolition and management of construction waste - Scale up the use of recycled building materials and resource recovery programmes
Develop more integrated strategies and transformative road maps, and enable conditions for specific innovations towards more sustainable food systems at the national and local levels - Engage food manufacturers and producers and hold them accountable for producing more sustainable products, reducing losses along supply chains, reducing post-harvest losses and food waste through the entire food chain from farm to fork - Adopt a polluter-pays approach to pesticides and chemical fertilizers to level the playing field by internalizing the costs of pollution	- Engage with and hold companies accountable for internalizing environmental risks and costs relating to the depletion of ecosystems, biodiversity loss, soil erosion and degradation, and water pollution through indicators, mitigation hierarchy and monitoring systems - Increase cooperation between Governments and industries to manage the coexistence of extractive and other land uses and make informed decisions and trade-offs - Work with Governments to manage and redirect revenues from extractive activities towards sustainable development and environmental services - Encourage increased transparency of and access to information on environmental and social risks and impacts to reduce asymmetries of information and have an integrated approach along the whole value chain	- All large cities should have mass transit and/or public transport systems that are effective, safe, friendly to all (in particular women and children) and reasonably priced - Countries and cities should adopt policies for active transport (walking and cycling) that will result in all new roads being built and existing roads being upgraded to include facilities for active transport - Cities should introduce clean bus fleets	- Promote the use of certification systems, as an approach to address sources of indoor pollutants, such as heating, ventilation and air-conditioning systems and particulates from toxic or chemicals in building materials, such as plaster, paint, construction compounds and plastics - Support the development of life-cycle approaches and databases for building- and construction-related products - Engage with stakeholders (e.g., designers, contractors, suppliers, Governments, end users and small and medium-sized enterprises) to strengthen environmental standards for building products and construction processes - Enhance decision-making on housing choices, including by consumers, through government housing strategies that enable integrated approaches at urban level (land use, infrastructure, transport, waste, district energy, etc.)
Promote more sustainable consumption of food through education on healthy, more nutritious and diverse diets, consumption of locally grown food and the reduction of food waste	- Increase the recycling rate of minerals and the availability of information and data on recycled material availability - Enhance coherence between market-based standards, due diligence processes and certification schemes with legislation and regulation in both countries of production and countries of consumption to ensure environmental responsibility from source to destination (e.g., conflict minerals)	- Urban mobility systems need to maximize shared vehicle trips; new approaches to urban planning will be required to achieve this - Cities need to develop integrated mobility plans that combine public transport with active transport and electric transport, this can include zoning	- Support the mainstreaming of sustainable buildings through industry initiatives and networks and promote incentives including green mortgages and leases - Raise awareness of resource and energy efficiency so as to influence consumer behaviour and decisions on lifestyle choices, including on buildings and appliances

Table 2 Examples of action to prevent, better manage or reduce pollution in key economic sectors

Ecosystem-based approaches and solutions to mitigate and manage pollution

- 60 There are many ecosystem-based solutions to pollution that require comparatively small investment but lead to large long-term benefits and engage both science and local knowledge. Managing and restoring ecosystems can help to regulate pollution across rural and urban landscapes. Green infrastructure can be used in urban areas to improve air quality. Wetlands serve as natural water filters. Artificial wetlands are frequently used to treat municipal or industrial grey water, wastewater and/or stormwater run-off. In phytoremediation,¹² plants are used to restore soils contaminated by heavy metals, such as mine tailings and polluted industrial sites. Integrated pest management and agroecological practices can significantly reduce the need for pesticides and fertilizers.

Promoting green technologies to mitigate and manage pollution

- 61 Three types of technology can be used to address pollution directly:
- Pollution prevention and reduction technologies.** These are both energy and resource efficient and create less pollution over their life cycle than the technologies that they replace. In some cases, they eliminate a source of pollution entirely;
 - Recycling technologies.** These recover valuable materials from waste or wastewater, preventing pollution of the environment. Care needs to be taken to avoid the recycling of toxic chemicals into new products;
 - Pollution treatment and control technologies.** These monitor and manage pollutant emissions and ensure that toxic substances are not released into the environment.
- 62 To overcome the challenges of the diffusion and affordability of and lack of information on relevant technologies, policies need to be put in place to support those technologies, which reduce the risks of investment and make the technologies more easily available to potential users. There is a need for information on what does and does not work, the costs and benefits and the potential for using local solutions based on local knowledge.
- 63 Mechanisms to provide support to developing countries on technology are thus part of many multilateral environmental agreements. The best available techniques and best environmental practices need to be systematically defined, as they are in multilateral environmental agreements including the Montreal Protocol and the Stockholm Convention. For developing countries, North-South and South-South collaboration can stimulate technology transfer and long-term national economic growth.
- 64 Environmental technologies also bring tremendous trade and investment opportunities. Innovation in the chemicals sector opens up new ways of using existing resources at lower cost or more productively. Such gains can be achieved through the supply of new chemical resources or through the development of safer alternatives to hazardous synthetic chemicals currently used in industry.

Integrating policies to tackle pollution: city-level action on waste

- 65 Local governments are key players in the move towards a pollution-free planet. The concentration of emission sources and high population density mean that many of the impacts of pollution are felt most acutely at the city level. Cities can, however, benefit from density efficiencies and economies of scale. While local context and culture shape the solutions and actions that local governments can take, cities provide opportunities for joint preventive action across sectors and hence potential for horizontal policy integration (see figure VII).

¹² P.L. Gratião and others, "Phytoremediation: green technology for the clean-up of toxic metals in the environment", *Brazilian Journal of Plant Physiology*, vol. 17, No. 1 (March 2005), pp. 53-64

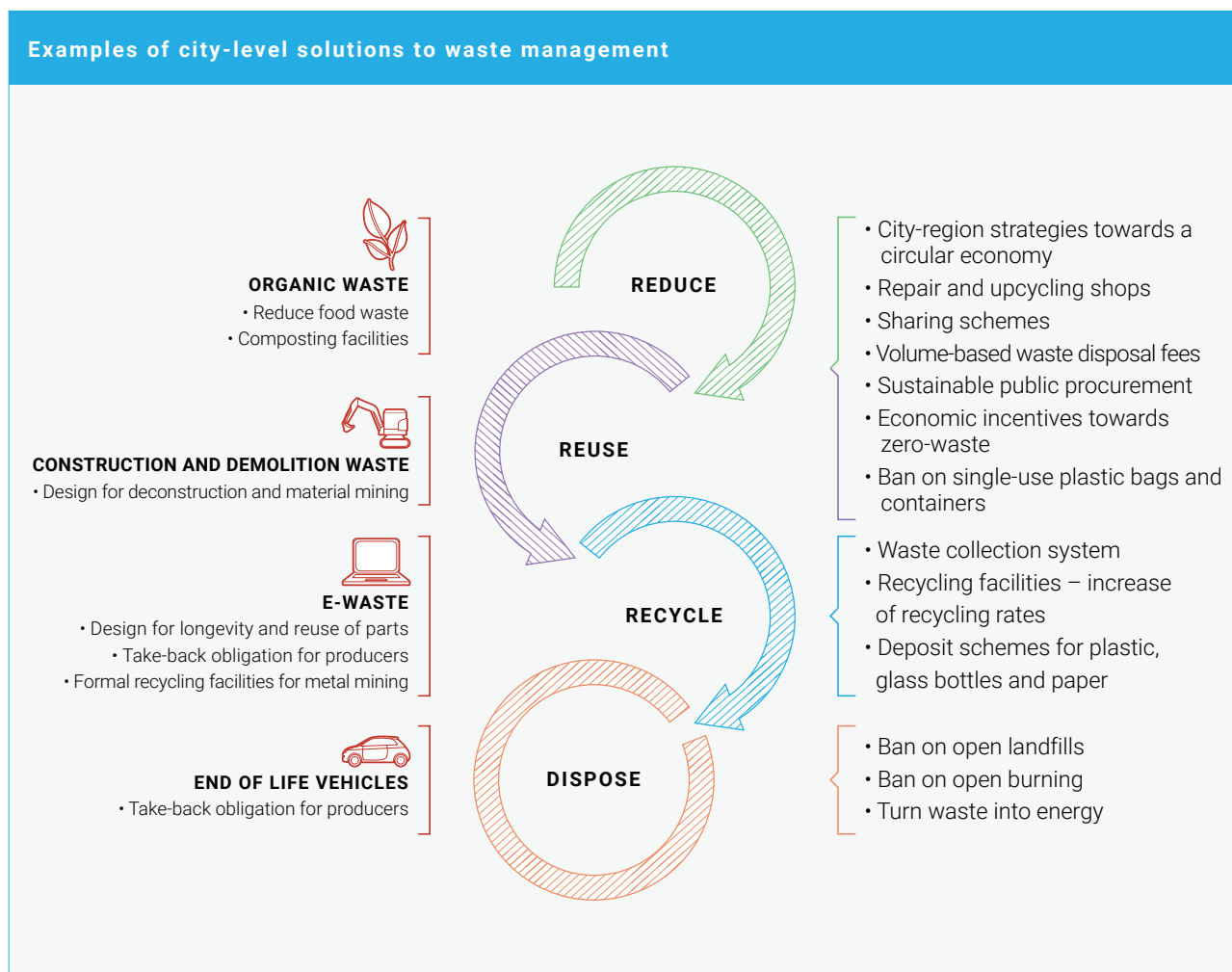


Figure VII Examples of city-level solutions to waste management

- 66 While local governments have authority in various areas, they remain dependent on national frameworks and support. Coherence between and vertical integration of policies between the national, regional and city levels enhance their effectiveness. For example, cities issue the building permits that enforce national building codes, which are designed to improve energy and resource efficiency in the construction sector. Policies at the national level guide municipalities' urban planning decisions and manage the urban-rural nexus.

Incentivizing responsible consumption and lifestyle choices

- 67 As consumption rises and populations grow, pollution increases. We need to find a way to live well and live lightly. All parts of society have a role to play:
- Governments** need to invest in infrastructure, including efficient and inexpensive public transport systems, differentiated waste collection and recycling centres. Regulatory instruments can be used to restrict some types of advertising and impose charges on bottles, cans and plastic bags. Public procurement can enhance the market for more sustainable goods and services;
 - Businesses** should systematically integrate sustainability into core business strategies and develop innovative solutions to meet consumer needs in a less resource-intensive way;

- c. **Educators** in formal and non-formal education sectors, research institutions, civil society organizations, community groups and consumer associations can equip students and the general public with the necessary understanding and skills regarding sustainable consumption so that they are able to integrate it into their daily lives and future professions;
 - d. **International organizations** can use their convening role to bring together diverse stakeholders, facilitate synergies and scale up pilot projects.
- 68 The challenges presented by pollution require a global, multi-stakeholder effort that includes intergovernmental bodies, business leaders, civil society and individuals. The third session of the United Nations Environment Assembly aims to set us on a path towards a pollution-free future through the adoption of targeted resolutions, the collection of pledges and commitments made by Governments, business and civil society, and solidifying the political will required to promote global actions to prevent and reduce pollution for present and future generations.



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