UNEP

SUMMARY OF THE
SIXTH GLOBAL ENVIRONMENT OUTLOOK

GEO-6

REGIONAL ASSESSMENTS:
KEY FINDINGS AND POLICY MESSAGES

UNEP/EA.2/INF/17

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Note by the Executive Director

Summary of the Sixth Global Environment Outlook Regional Assessments:

Key Findings and Policy Messages

The present note summarizes the key findings and policy messages stemming from the Global Environment Outlook (GEO-6) assessments conducted for the six United Nations Environment Programme regions (Africa, Asia and the Pacific, Europe, Latin America and the Caribbean, North America and West Asia[1,2]), pursuant to resolution 1/4 of the first session of the United Nations Environment Assembly.

Each GEO-6 regional assessment includes a review of regional priorities, the state of the environment in the region, the main trends that will affect the region's environment in the future and an analysis of the actions needed for the region to achieve a more sustainable future. The findings will provide key inputs for the global GEO-6 assessment and for relevant regional and national forums and processes.

The summaries of the GEO-6 regional assessments were endorsed at a series of regional meetings convened in March and April 2016 with members of the GEO-6 High level Intergovernmental and Stakeholder Advisory Group (HLG).

Achim Steiner

United Nations Under-Secretary-General and
Executive Director, United Nations Environment Programme

[1] In the context of the present document the term "West Asia" applies to the GCCs and Mashriq regions and Yemen.

[2] The GEO-6 West Asia Regional Assessment is one of a series of six UNEP regional assessments which will underpin the global GEO-6 assessment.

Africa

Overall picture

1. Spurred by its Agenda 2063, Africa aims to establish a prosperous region characterized by sustainable inclusive growth, peace and good governance. The region's growth path shall be led by increased agricultural productivity, industrialization, investment in infrastructure development and renewable energy, conservation of biodiversity, sustainable and fair and equitable use of its genetic resources, clean air and water, and better adaptive capacity to climate change.

2. Africa faces a great challenge of sustaining rapid economic growth as its population is expected to double to approximately 2.5 billion by 2050, while safeguarding the life-support system provided by its rich natural capital, which underpins the realization of its long term vision. It is therefore imperative that such growth must consider the region's relatively weak environmental governance and a paucity of accurate and up-to-date environmental and socio-economic data for evidence-based decision-making.

Key findings

3. The GEO-6 Africa Regional Assessment affirms the importance of both Agenda 2063 and Agenda 2030 as defined by the Sustainable Development Goals (SDGs). Both contain common elements for a development trajectory that will provide Africa with a healthy living environment while ensuring good health and quality of life for her people. The two are also critical to preserving and valuing Africa's natural capital for the benefit of its citizens and their livelihoods. In order to realize these visions, Africa's public institutions are called upon to build flexible and adaptive governance structures.

4. **Indoor air pollution** is a major problem across Africa, responsible for an estimated 600 000 deaths per annum. Due to their reliance on the use of biomass sources of energy for cooking, lighting and heating, 90 per cent of the region's population is exposed to this harm. Africa is called upon to invest in quick win solutions such as better ventilated housing and clean cook stoves, while also adopting medium to long-term measures to provide clean forms of energy such as electricity.

5. Growth in urbanization, industrialization, motorization and the emission of mineral dust from deserts have increased **outdoor pollution** in Africa. The transboundary transport, dispersion and eventual deposition of pollutants also contribute to raise outdoor pollution levels in the region. Especially for urban areas, the observed trend in levels of outdoor pollution requires the implementation of transport solutions that include setting standards for the condition of road vehicles and investing in sustainable mass transport systems

6. Off-grid electricity supply in remote rural areas and greater uptake of **renewable forms of energy** such as solar, hydropower and wind provide a promising and realistic basket of possibilities for meeting Africa's energy needs. With only 10 per cent of the region's hydropower potential exploited, there is considerable scope to use this source of energy in Africa for the generation of electricity, subject to careful consideration of the environmental consequences of proposed schemes.

7. Despite recent improvement, about 40 per cent of Africa's population still does not have access to **potable water**, and 70 per cent lack adequate sanitation facilities. As a result, water-borne diarrheal infections are responsible for almost 8 per cent of annual deaths in the region. This calls for an urgent need to invest in low-cost technologies for the management of wastewater, as well as the delivery of safe drinking water.

8. **Groundwater** represents a significant under-exploited water resource, but as an initial priority there is a need to substantially improve the information base regarding this resource. With 63 shared river basins, Africa is strongly urged to engage in effective integrated water resources management for the better protection of catchments and increased intra-basin cooperation for equitable use of limited water resources.

9. Many of Africa's **fisheries**, both inland and marine, face overexploitation from illegal, under-reported and unregulated fishing. Aquaculture holds great promise for exploiting this potentially sustainable source of protein, but it is a necessary pre-requisite to take biodiversity and other environmental implications into account when promoting this industry.

10. Regarded as Africa's most valued asset, **land** is a critical resource for all aspects of life and development. However it faces new challenges from changing use practices, including urbanization, mining, deforestation, agricultural expansion and infrastructure development. Sustainable land management practices are needed to reconcile the diverse uses of this resource.

11. The region has six of the world's top ten countries experiencing rapid **urbanization**, and as a consequence faces far reaching changes in settlement patterns in the years ahead. The movement of an estimated 450 million people from rural to urban areas by 2050 will place enormous strains on urban institutions, infrastructure, and financial and other resources, while also exacting huge demands on land for settlement. Combatting this challenge will require good spatial planning at all levels of government to ensure that cities have the capacity to cope with growing populations. Making rural areas more attractive to the youth through investment in rural development is another important intervention.

12. Africa has 60 per cent of the world's unconverted arable land, indicating a great potential for investment in **food production** on a massive scale, which if realized could enable the region not only meet its own food needs, but also export globally. Unlocking this potential represents an important challenge, particularly bearing in mind other competing land uses, including for pasture and cultural values. Currently, land productivity remains low in the region; a result of mineral poor soils and land degradation caused by inappropriate farming practices, deforestation, mining activities, and desertification. Africa is therefore called upon to embrace the Comprehensive Africa Agriculture Development Programme and its associated technologies for irrigation and fertilizer use, whilst nurturing the continent's agro-biodiversity and agro-ecological knowledge, to result in higher yields per unit area.

13. A further issue of concern is poorly defined **land tenure** arrangements. Securing land tenure for both women and men will ensure Africa's land capital is both valued and protected. Africa is therefore urged to develop best practice guidance regarding tenure arrangements and processes, and institute appropriate legislative and administrative reforms to ensure that meaningful progress is made towards achieving a land market built on a range of secure tenure options and increased land productivity.

14. Africa's rich **biodiversity** has been a basis for ecosystems services including food, clean water and air. However, this critically important natural capital faces significant threats from illegal trade in wildlife, mono-cropping, air and water pollution, forest loss, climate change, and increased prevalence of invasive alien species. The link between biodiversity and human health and wellbeing is increasingly better understood, but further research is required, especially with regard to zoonoses.

15. The weak valuation of biodiversity as an asset for economic development contributes to weak conservation efforts and undermines its importance to agriculture, for example in protecting pollinators and maintaining diversity to adapt to climate change. It is recommended that Member States actively include a system of factoring biodiversity and ecosystem services into **national accounting systems.** Africa should also ensure that the African Union strategy on illegal trade in wildlife is translated into action, fully implemented and regularly monitored.

16. Africa faces both enormous challenges in relation to environmental management, and equally huge opportunities for 'doing things better'. The goal to build an integrated, prosperous and peaceful region that is **resilient to future shocks** can only be reached with the understanding that clean and healthy air, water, land and biodiversity are necessary to support this transformation. All efforts must thus be taken to ensure the protection and integrity of these resources that are critical life-support systems for sustained human wellbeing.

17. Whilst the inherent **uncertainty and diversity in potential futures** makes it tenuous for a set of prescriptive policies to be established, policy decisions should aim to minimize environmental and developmental trade-offs, and maximize Africa's ability to safeguard its natural capital effectively. Emphasis should be placed on improving protection of the environment, addressing critical data gaps, and developing the human and technical capacities required for a sustainable future.

18. The assessment concludes that **low-carbon, climate-resilient choices** in infrastructure, energy and food production coupled with effective and sustainable natural resource governance are key to protecting the continent's ecological assets that underpin a healthy society.

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Asia and the Pacific

Overall picture

1 The GEO-6 Asia-Pacific Regional Assessment is based on scientific review of critical environmental trends identified by member States and stakeholders at the Regional Environment Information Network (REIN) Conference held in Bangkok, 27-28 April 2015. The First Forum of Ministers and Environment Authorities of Asia-Pacific, held shortly after the REIN decided on priority environmental actions for the region mirroring these critical trends.

2 **Changing demography,** lifestyles and access to basic services: Rapid urbanization, affluent life-styles, and increased demand for resources and services associated with economic growth are exerting increasing pressure on ecosystem resources;

3 **Increasing inefficiency in the use of resources**: Increasing resource use, with little improvement in the efficiency of such use, is causing widespread environmental degradation, loss of ecosystem services, generation of excessive waste and additional financial burdens;

4 **Increasing vulnerability to the impacts of natural hazards and extreme events**: The effect of climate change and disasters and increasing vulnerability due to unplanned development and urban migration will continue to impose economic losses that could offset development gains, increase poverty and inequity, and threaten water and food security;

5. **Increasing environmentally-related health risks**: While there is improvement in life expectancy, there are increased health threats often with disparate effects based on gender and age, along with costs from widespread air pollution, harmful chemicals and heavy metals, and emergence and spread of vector-borne diseases; and

6 **Widening gaps across the landscape of policies and legislation and their implementation**: There has been increasing policy intervention to cope with existing issues but the policy gap is widening due to ineffective policy implementation, a poor scientific base for policy formulation, and rapidly emerging environmental issues.

Key findings

7 The analysis of key environmental themes on air, land, biota and ecosystems, freshwater, coasts and oceans, and waste using drivers-pressures-state-impact-response (DPSIR) framework shows accelerating environmental degradation widely across the region and its impact on human well-being. Key findings of the Assessment are:

8 **Air:** Sulphur dioxide and nitrogen oxide emissions have reduced, but ambient concentrations of ozone and fine particles (short-lived climate pollutants (SLCPs) such as black carbon) have continued to increase. Trans-boundary smoke haze pollution, due to open biomass burning and improper land-use practices, is becoming the key regional air quality problem in Southeast Asia, and highlights the urgency of multilateral solutions and regional cooperation. Indoor air pollution from burning poor quality fuels or biomass, impacts women and children throughout the region contributing to health effects. Climate change impacts on cities and infrastructure are intensified in some coastal zones and Pacific island countries, while extreme climate events are becoming the major cause of disasters in the region.

9. **Land**: Land degradation has been intensified over most of the region, with consequent displacement of indigenous people, loss of biodiversity, and reduction in important forest products. Land degradation has additional implications for water resources in terms of soil water content and groundwater recharge. The total forest area has increased in some areas of Asia since 1990 due to reforestation efforts, but there are significant sub-regional differences. Meanwhile, there is continuous loss of wilderness, natural forest systems, mangroves and other natural systems to croplands and urban growth.

10. **Biota and ecosystems**: Ecosystems integrity and biodiversity are threatened throughout the region due to extensive agriculture, oil palm and rubber plantations, aquaculture and illegal wildlife trade. Natural forest areas in Southeast Asia and the Pacific, recognized as global biodiversity hotspots, declined drastically in 1990–2015. The number of threatened mammal and plant species increased by more than 10 and 18 per cent respectively in the last decade.Three-quarters of all threatened birds on oceanic islands are also in danger from invasive species. A quarter of all conifers and cycad species are threatened, as are one fifth of marine mammal species. In the oceanic countries and Small Island States, over 25 per cent of hard warm-water corals are experiencing bleaching, mainly due to high thermal stress, and are impacted by dumping of plastic debris and micro-plastic hazardous waste in the oceans.

11. **Freshwater**: Water scarcity and deteriorating water quality are commonplace throughout the region especially in Northeast and South Asia. As climate change impacts on water resources become more pronounced, particularly in rivers originating in the Hindu Kush Himalayas, flood and drought events will become more frequent and intensified. Contamination of water sources from human and livestock sewage is a major concern across the region; and the widespread contamination of ground water by pharmaceutical and personal care products, nanomaterials, and organochlorides increase the exposure to human health risk, especially for women and young children. Water-related diseases and unsafe water contribute to 1.8 million deaths annually and 24.8 million disability-adjusted life years in the region.

12. **Coasts and oceans**: The coastal zone is inherently attractive for human settlement and continued urbanization draws in greater populations, with 325 million more people expected to live in the coastal zone by 2025. About 60 per cent of the coastal mangroves in Asia and the Pacific have been cleared for development and more than 80 per cent of the coral reefs are at risk. Severe erosion prevails on one-quarter to one-third of the coastlines in Southeast Asia. Pollution caused by plastic debris and microplastics is an increasing concern in the region.

13. **Waste**: Municipal solid waste generation is expected to rise from 870 million tonnes in 2014 to 1.4 billion tonnes annually by 2030 in the region. New and complex waste streams like e-waste, food waste, construction/demolition waste, disaster waste and marine litter are emerging. Uncontrolled dumping is still the main waste disposal method in the region, leading to leachate run off, methane emission, spontaneous combustion, and other environmental problems. However, recent emergence of waste to energy investment programs could be further enhanced to provide better waste disposal.

The way forward: policy messages

14. Regional economic growth and urbanization have helped lift millions out of poverty to middle class affluence, and improved access to basic services. These achievements, however, have come with heavy costs to natural capital, biodiversity, ecosystem functioning, and human health. These stressors contribute to gender and economic inequalities and undermine regional economic growth itself. Climate change, air pollution and ecosystem disturbance are emerging issues and could reverse recent progress in human development.

15. To counteract the socioeconomic drivers leading to environmental degradation, an economic transformation that is particularly based on improved energy and transportation systems and smart green growth for urban areas is urgently needed. Thirty nine countries out of forty one in the region, submitted their respective *Intended Nationally Determined Contributions* (INDCs) to UNFCCC before the Paris Conference, illustrating the region's commitment to mitigate climate change. The region could strive for more transformational change aiming at low-emission development strategies to achieve more than the laudable commitments in their INDCs.

16. The SDGs will help to promote a more integrated and holistic approach to resource management and ecosystem preservation. With increasing and large investments in new infrastructure expected over the next two-to-three decades, there is optimism in the region that the countries can leapfrog to smarter solutions for resilient development and lasting prosperity.

17. **Decarbonize development and improve resource efficiency for transition to an inclusive green economy.** The region has been taking a development path which is carbon-intensive, and is contributing to emission levels unsafe for life and disruptive to the global climate. Most important areas for decarbonizing economies are energy, infrastructure, cities and transportation. There is a large potential for achieving energy efficiency through energy demand management combined with regulations and economic instruments. The transition to renewable energy requires stable regulatory regimes aligned with long-term vision for energy systems, to build investor confidence. The urban and transportation infrastructure sectors require innovative low-carbon policies, market-based instruments and technology solutions to ensure that the development is environmentally sustainable. Overall, decarbonizing strategies will generate technology innovation, business development and job creation, contributing to broader socioeconomic development.

18. Regional consumption of minerals, ores, fossil fuel and biomass exceeds the other regions and is leading to the rapid depletion of regional resources. Transition to sustainable production and consumption practices would curb demand for materials and a range of policy tools are available to help change resource use patterns. Taxes and market-based instruments that shift consumer preferences and promote green investment and innovation are essential. Governments could invest in stimulating green-reforms in key economic sectors and limit spending in areas that deplete natural capital. Many communities in the region already live within ecologically sustainable limits and these lifestyles could be protected as development takes place.

19. **Protect and enhance natural capital and ecosystem integrity**. The region's diverse ecosystems and rich biodiversity provide food, nutrition, water, clean air, and the materials for infrastructure. Ensuring ecosystem integrity requires accounting for natural capital in the system of national accounts and incorporating ecosystem services values into decision-making and policy formulation by governments. Regulatory and incentive-based policies are required for protecting natural capital. Market-based mechanisms such as tax on pollution and non-renewable resource use are effective tools to minimize pressures on natural capital. Regulatory policies would include zoning, establishment of protected areas and Environmental Impact Assessments (EIA) of projects. Governments also need to invest in conservation and restoration of degraded natural capital. Engaging local communities in the protection and management of natural habitats and protected areas are among the most effective tools for resource protection in many countries, which could be up scaled and replicated

20. **Build resilience to natural hazards and extreme climate events**. The region has more reported natural disasters and extreme events than any other area in the world. The frequency, magnitude and impact of climate related disasters has increased recently and ensuring the safety of people, security of their livelihoods, and protecting ecosystems and their services require multiple measures. One priority is to reinforce early-warning systems; and build regional capacity for disaster management, recovery and rebuilding. Ecosystems approach addresses the crucial link between land, water and living resources thus provides a promising strategy to increase the resilience of ecosystems and support sustainable livelihoods. Ecosystem-based adaptation measures would include

alternative livelihoods, infrastructure upgrades, soil conservation, water regulation, etc. Adaptation strategies yield multiple development benefits and maximizing these synergies requires mainstreaming climate change adaptation into national planning.

21. **Respond to environmental health risks**. Widespread pollution and the impacts of extreme environmental events are root causes of disease burdens especially among lower economic strata and women. There is widespread risk of environmentally induced mortality and morbidity from indoor and urban air pollution, drinking water contamination, poor sanitation, and vector-borne diseases. Air and water quality standards establishment and enforcement, Cartagena bio-safety protocol enforcement, climate and disaster related responses, and integrated vector management are critical policy responses for the region. To reduce pollution requires both regulatory and economic approaches to accelerate needed energy and resource efficiencies, to promote renewable energy and develop sustainable transportation infrastructure. Integrated land-water-waste management including the agro-forestry sector is necessary to reduce pollution of land and water resources and to control the spread of vector-borne diseases.

22. **Strengthen environmental governance for effective policy diffusion at multiple scales**. Environmental regimes and institutions are still inadequate in many countries of the region, which leads to inadequate policy responses, weak enforcement of laws and regulations, and poor compliance with MEAs. Mandates, operational arrangements and capacity of these national institutions need to be assessed and revitalized so that they are able to effectively discharge their current responsibilities, and in the future, respond to increased demand from SDGs which call for governments to take strong and decisive environmental actions. Since governments are organized by sectors, a new way of thinking about environment and development, including the gender dimensions, based on SDG's integrated approach needs to be established across ministries and among political leadership. In addition, implementation of the SDGs requires strong science-policy dialogues, effective environmental assessments and monitoring, and the finance and technology support. Governments could also promote civil society and public participation in solutions to improve environmental quality.

23. **Strengthen science-policy interface and access to knowledge**. Environmental issues and their links to development are complex, so scientific knowledge of this relationship is fundamental to achieving sustainable development. National platforms and other mechanisms are necessary to facilitate science-policy discussions on national environmental issues among the government, business and scientific/research community, A high national priority is to strengthen or establish a mechanism for regular reporting on environment to national parliamentary and planning processes. Awareness raising among the local business and civil society communities through education or media outfits is necessary. Education targeting national administrations would help build an equitable and gender-balanced workforce able to effectively diffuse environmental policy across all economic and societal sectors. Better monitoring and data management systems combined with continuous building of analytical capacity are necessary to support the assessment and research that underpins policy-making.

24. **Enhance international/regional cooperation on climate, air quality and other environmental issues**. Countries in the region are parties to many MEAs at the global and regional levels, but implementation has been insufficient as many countries lack implementation capacity. An urgent need is to strengthen capacity to effectively implement the obligations under these MEAs, including the development and enforcement of national legislation and regulations. In that regard, national implementation of the ASEAN Agreement on Transboundary Haze Pollution is a priority. Regional cooperation on disaster management, e-waste management and illegal wildlife trade are also priorities. Elements of a regional support system are in place to support disaster response and emergency relief efforts, but need reinforcing with the expected increase in disasters and extreme climate events. Implementation of the SDGs will require international cooperation mechanisms to support knowledge sharing, technology transfer and technology financing.

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Europe

Overall picture

1. The *GEO-6 Assessment for the pan-European region* argues for more urgent action, both through existing policies and the implementation of the 2030 Agenda for Sustainable Development (2030 Agenda), to address the challenges that the region is facing.

2. Regional and global multilateral environmental agreements have improved regional environmental conditions, access to information and public participation. Further improvements are feasible through better implementation and improved access to justice.

3. The region's resource footprint is unsustainable, owing to its overuse of natural resources and its trading patterns with other regions. Ecological, societal and economic resilience will be negatively affected in coming decades by global megatrends that are largely outside the region's direct control and influence.

4. Environmental challenges are now more systemic, multifaceted, complex, uncertain and intertwined with socioeconomic factors. Three of nine planetary boundaries have been crossed due to human-induced changes: i.e., climate change; rate of biodiversity loss; and human interference with the nitrogen cycle. Poor air quality, climate change, unhealthy lifestyles and the disconnection between society and natural environments increasingly affect human health in the region and give rise to new risks.

5. Resilient ecosystems, efficient resource use, clean air, sufficient clean water, sustainable management of chemicals and waste and sustainable cities are essential for a healthy planet and healthy people. However, neither environmental policies alone nor economic and technology-driven efficiency gains will be sufficient to achieve sustainability. More ambition is needed. The 2030 Agenda and its Sustainable Development Goals recognize this reality.

6. Living within planetary boundaries will require fundamental transitions in energy, food, mobility and urban systems and entail profound changes in predominant institutions, practices, technologies, policies and lifestyles. New governance coalitions involving national and subnational levels of government, businesses and citizens are urgently needed.

7. The transition to a truly inclusive green economy must be built on resilient ecosystems, clean production systems, healthy consumption choices, reduced negative distributional effects of environmental policies and improved overall environmental justice for all.

8. Positive long-term outlooks call for an urgent shift from incremental to transformational change in order to: decarbonize energy and transport systems and reduce other harmful emissions; restore ecosystems; decouple resource use, including material footprints, from overall economic performance; "green" public and private sector procurement; strengthen environmental responsibility in business; and incentivize lifestyle changes.

Key findings

9. **Climate change** is one of the largest threats to human and ecosystem health and to achieving sustainable development. It is also an accelerator for most other environmental risks. Growing impacts include melting ice, sea level rise, increasing flood and drought

frequency, degrading ecosystems, loss of biodiversity, soil function and food productivity, changing disease vectors and exacerbated air pollution impacts on health.

10. Greenhouse gas emissions in the European Union are stable or declining, but in the South- Eastern European subregion they are increasing. Largely through efficiency gains, emissions have decreased in the majority of sectors except for transport, refrigeration and air conditioning. Further mitigation actions should be targeted at transport, agriculture, energy and raw materials, as part of the transition to a circular economy.

11. To stay within range of 2ºC–1.5ºC temperature increases and already foreseen impacts, strengthened government action at the national and subnational levels, as well as multistakeholder coalitions, are needed on mitigation and adaptation, including accounting for emission footprints. Adaptation priorities include: improved water management, notably with regard to coastal floods; growing crops suited for increased temperatures; and building green infrastructure to enhance resilience to extreme weather, particularly in urban areas.

12. **Air quality** is the largest health risk to the pan-European population, with disproportionate effects on children, the elderly and the poor. Over 500,000 premature deaths in the region were attributable to ambient air quality and 100,000 to indoor air quality in 2012. More than 95 per cent of the urban population are exposed to pollution above the World Health Organization guidelines. Excessive deposition of nitrogen continues to damage ecosystems. Lifestyles, consumption and transport patterns have the most influence on air quality in region.

13. Many parts of the region have seen improvements in air quality over recent decades thanks to effective regulations that reduced pollutant emissions. Many of the sectors that impact on air quality also contribute to greenhouse gas emissions. Particulate matter and ozone are the most important pollutants contributing to adverse outdoor air quality.

14. The bodies under the Convention on Long-range Transboundary Air Pollution and its protocols have been successful in connecting scientific evidence with policy actions. The available evidence supports further policy actions on integrated air quality and climate policies. Policies should also prioritize lifestyle changes and efficiency measures, reductions in emissions at their source and emerging risks, such as ozone and newly identified health effects. Research efforts are required to bridge the considerable knowledge gap on indoor air pollution.

15. **Biodiversity** loss and ecosystem degradation continue apace, despite increased conservation and restoration efforts. The main regional pressures are from increased landuse change, particularly agricultural intensification, urbanization and habitat fragmentation by transport infrastructure. In Western and Central Europe, only 38.4 per cent of the original species abundance remains, while 77 per cent remains in the Russian Federation.

16. Full implementation of the European Union Natura 2000 network, in conjunction with the Emerald Network and the Pan-European Ecological Network, is needed. Together with increased synergies with other existing environmental policy instruments, this would alleviate pressures by providing protection for a broad range of terrestrial and aquatic ecosystems, habitats, species and landscapes of pan-European importance.

17. Integrating biodiversity and ecosystem considerations into all aspects of spatial planning would further enhance protection efforts, as would new regulations for land and soil protection. Ecosystem-based management approaches offer a cost-effective means to alleviate the multiple pressures on biodiversity, especially from food and forestry production, consumption and tourism.

18. **Chemical** pollution impacts on human health and ecosystems across the region, with hazardous chemicals of particular concern owing to their toxicity, shortcomings in their management and a lack of transboundary controls. Other priority concerns include

endocrine disruptors in consumer products, hazardous substances in electronic and electrical products, environmentally persistent pharmaceuticals and nanomaterials.

19. Mercury pollution in the region is still significant, and new emerging issues such as some toxic chemicals in consumer products pose challenges yet to be tackled. Heavy metals and persistent organic pollutant concentrations in air, sediment and soil have on average been reduced across the region, though hotspots remain. Parts of Eastern Europe, the Caucasus and Central Asia have legacy stockpiles of obsolete pesticides, as well as a continued reliance on heavy and highly resource-intensive industries and chemical-intensive agriculture.

20. Full and coherent implementation of the three global conventions on chemicals would improve management controls and reduce risks for human health and ecosystems. The Globally Harmonized System of Classification and Labelling of Chemicals has not yet been fully implemented. The regulations on products pertaining to chemicals must be improved. More policy attention is needed to early signals from science.

21. **Waste** volumes continue to grow. Disposal of waste in landfills is the major environmental challenge in several parts of the region, despite progress with recycling in many countries. Handling of waste from electrical and electronic equipment is a growing concern, with control of transboundary movements insufficient under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

22. Reducing food waste in the region is a key challenge. About a third of European farmland is currently used to grow food that is thrown away. Food waste mainly occurs at the distribution and consumption stages in Western and Central Europe, whereas production processes generate most losses in other parts of the region. Plastics waste management is a major challenge given limited recycling options, lack of sustainable substitutes and growing concerns about marine litter.

23. The waste hierarchy is widely accepted as a guiding framework to increase economic value from resource use and to reduce waste. Closing resource-use loops through the promotion of circular economy principles offers further pathways to minimize waste and maximize resource use.

24. **Freshwater** pollution — mainly from agriculture — to surface waters and groundwaters is the main reason for poor water quality, also affecting coastal areas and regional seas. Between urban and rural communities there are large differences in the levels of access to sanitation and safe drinking water. There are also large differences within the region regarding the collection and treatment of wastewater.

25. Irrigation, over-abstraction and highly polluted return flows threaten groundwater supplies, most notably in Central Asia. The chemical status of water is generally improving in the European Union, but progress is slow for diffuse pollution. Microplastics and emerging contaminants — such as brominated flame retardants, certain veterinary and human pharmaceuticals and anti-fouling biocides — have made their way into all the pan-European seas, via rivers. In several transboundary river basins, water allocation challenges are increasing.

26. The ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes and the European Union Water Framework Directive are the most important instruments, alongside bilateral and multilateral conventions on transboundary river, lake and groundwater basins, such as the Danube. Improved coordination between energy, agriculture, biodiversity and water policies can further improve water quality and quantity, as well as support climate change adaptation objectives and increase ecosystem resilience.

27. **Coastal, marine and ocean resources** are overexploited for multiple reasons and with wide-ranging impacts. The major threats are urbanization, agriculture, fisheries, transport, industrial development, chemical products and effluents, and energy production. Efforts to reduce pollution loads are overwhelmed by more systemic challenges, such as climate change.

28. Biodiversity loss and habitat degradation of marine ecosystems continues, heightening the risks of the irreversible loss of ecosystems' resilience and services. Nutrients loads also remain high. The impacts of new pollutants, including plastic wastes and marine litter, are growing. Climate change impacts are increasing and include acidification, sea level rise and shifting species vectors caused by warming waters.

29. Due to the multitude of socioeconomic-ecological links, threats and negative impacts, there is a need for a more integrative approach to national, supranational, interregional and global policy responses and transnational cooperation. Ecosystem-based management approaches offer promising, cost-effective ways to deal with the cumulative negative effects of human activities.

30. **Land**-use change is leading to the deterioration of the physical and chemical properties of soils, thereby causing water and air pollution. Soils are also under threat from climate change, erosion, contamination, salinization, floods and landslides, which in turn threaten food and nutrition security. Urban sprawl causes the loss of arable land, natural habitats and biodiversity.

31. The loss of green areas in cities has exacerbated climate change effects and caused deterioration in the physical and mental health and cognitive development of children. The externalization of pan-European land demands means that for every hectare of land used in the region, four are used elsewhere to meet the final demand in the region's economies.

32. Legislation in this area is considered inadequate throughout the pan-European region. Sustainable land management policies are needed to deal with multiple threats and impacts. Promoting practices such as organic farming, agroecology and integrated soil fertility management would sustain crop production systems. Restoring green areas and installing green roofs and "living walls" would mitigate climate change impacts in cities.

Governance, knowledge and outlooks

33. The pan-European environmental governance system that has emerged over the past three decades shows important differences between countries, as well as gaps and unexploited opportunities for synergies between policies and priority areas. Enhanced cooperation is essential to address the multiple systemic, transnational and transboundary problems and the global challenges that are expected to impact the region in coming decades.

34. Further environmental progress can be achieved in the coming years through improved implementation of existing policies. In the longer term, an array of global megatrends coupled with continuing unsustainable systems of production and consumption are expected to exacerbate environmental pressures and impacts.

35. **Global megatrends** expected to affect the longer-term environmental outlook include: diverging population and migration trends; increasing urbanization; more global competition for resources; an increasingly multipolar world; and climate change. Some of these trends offer opportunities for new innovations; others increase the risks of resource scarcities and conflicts.

36. The pan-European outlooks suggest in particular the need to halve material resource use in Western Europe and to stabilize it elsewhere. Other outlooks for the region point to increasing water stress in Southern Europe and Central Asia, a significant loss of

biodiversity and ecosystem services across the region, acute climate change impacts on coastal and agriculture systems and further human health impacts from air pollution and exposure to chemicals. Increasing policy coherence across these thematic areas could improve the longer-term outlook overall.

37. **Environmental degradation** has also exacerbated social problems and increased social and economic injustices and inequalities. Improvements have been achieved through legal frameworks for public participation in decision-making. These need strengthening urgently, given the rate and scale of current and expected further degradation in coming decades.

38. Successful models of **environmental governance** should be built upon well-designed policies, their implementation and enforcement, pay close attention to early signals from science and society and ensure adequate oversight capacities and investments in knowledge systems, e.g., data, indicators, policy evaluation and sharing platforms. Greater investments are needed in environmental accounting systems to ensure external costs are addressed, and in foresight processes to identify possible future risks, opportunities and conflicts.

39. Greater application of th**e "precautionary principle"** can reduce risks in a world where thresholds and limits are being breached and where endpoints are increasingly uncertain. Achieving progress under greater uncertainty requires coalitions between government institutions, businesses and civil society, to agree on pathways for tackling different societal risks. Vertical coordination between national and local policy levels will be instrumental in accelerating the transition towards sustainable development models in urban areas.

40. The **Sustainable Development Goals** should be seen as providing a strategic opportunity for environmental policy to contribute to transformative processes as well as a support mechanism for strengthening adaptive capacities and resilience within societies on all levels, instead of a cost factor and constraint on development and competitiveness. Operationalizing the Sustainable Development Goals will require ambitious quantitative targets and indicators so that progress towards sustainability can be tracked properly to ensure convergence on a shared regional vision and ambition within planetary boundaries.

41. There is no doubt that achieving a healthy planet and healthy people requires urgent transformation of the current systems of production and consumption that most contribute to environmental degradation and inequalities in human health and well-being.

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Latin America and the Caribbean

Overall picture

1. The *GEO 6 Regional Assessment for Latin America and the Caribbean* identifies the main environmental changes that have been observed in the region since GEO-5 (2012) and GEO LAC 3 (2010); and considers priorities for action within the overall framework of the new 2030 sustainability agenda. At the beginning of the GEO 6 process, governments of LAC and other key stakeholder groups (at the GEO REIN Conference held in Panama City in May 2015) identified a number of regional priorities that helped to shape the focus for assessing suitable response options for the region. These priorities included: impacts from climate change and natural hazards; biodiversity and ecosystem services; natural resources and tourism; economic development and sustainable consumption and production; health and environment; land use, land degradation and land planning; environmental governance; environmental information; and communication and public awareness.

2. The *GEO 6 LAC* report is structured into four chapters; the first two present the results of the assessment following the Drivers-Pressures-State-Impact-Responses (DPSIR) framework, focusing on 5 major environmental themes (Air, Freshwater, Oceans, Land, and Biodiversity). Chapter 3 evaluates policy progress made in key regional priority areas; reviews particular policy success stories; and assesses the enabling conditions for achieving the Sustainable Development Goals that include the natural environment as an important component/ consideration. Chapter 4 presents a set of regional scenarios, and thereby provides insights into some of the options available to decision-makers as they consider how to move the countries of the region onto more sustainable development pathways. The main findings and key messages from the report are presented as follows:

Key findings

3. LAC is a **biologically rich region** with a complex tapestry of political, social and natural contrasts. These contrasts are evident in the spectrum of the sizes of countries and economies; in the diversity of geographical and ecological features; and in the manners in which cultures continue to interact with the natural environment. Within the diversity and contrasts however, LAC economies continue to share a persistent, heavy reliance on primary products and natural resources, which account for approximately 50 per cent of all good exports. On the mainland, there has been an increase in the reliance on exports largely driven by extra-regional demands for commodities such as agricultural products (including soybean, coffee and meat) and mineral resources (ores and metals). These transformations are most prominent in South America, where there was an increase in exports from 24 to 40 per cent between 1990 and 2015. Additionally, in 2013, international tourism receipts were 45 per cent of total exports from the Caribbean region, more than twice the amount earned by Mesoamerica, and 9 times greater than South America.

4. **Urban areas** continue to grow in LAC. Urban population increased by more than 35 million people between 2010 and 2015, and is expected to climb to a total of 567 million persons by 2025. Urbanization is highest in South America, with an estimated 346 million people (83 per cent of the population) living in urban areas in 2015. However, the rate of urbanization is fastest in the Caribbean where 62 per cent of the population resided in urban areas at the start of the millennium, increasing to 70 per cent in 2015 and projected to reach 75 per cent in 2025. In most cases, the concentrations of people as well as the patterns of production associated with urbanization exacerbate environmental degradation.

5. **Air quality** in cities has declined, and in most cities where data are available, the concentrations of particulate matter and ozone are above the WHO guidelines. This increases the vulnerability of urban dwellers to respiratory diseases; and more than 100 million people in the region live in areas susceptible to air pollution. Moreover, the impacts of cities are not restricted to the urban area. According to the World Water Quality Assessment (2016), it is estimated that 25 million rural people are in contact with polluted surface waters originating from urban areas. This increases health risks and mortality rates in rural areas.

6. LAC currently accounts for only 5 per cent of global **greenhouse gas emissions;** however the region's contribution to global aggregates is growing, particularly because of demands from the transport and industry sectors. According to World Bank (2015), carbon dioxide emissions from the burning of fossil fuels and the manufacture of cement in LAC increased in absolute terms (+14.18 per cent) over the period 2006 to 2011, although their levels as a proportion of GDP have declined. Reducing emissions of greenhouse gases with long residence time in the atmosphere is considered an important challenge in LAC; and contaminants such as black carbon are now a priority because of their radiative forcing action on the climate system.

7. While **climate mitigation** must be a key component of strategies to combat climate change in LAC, the urgency of strengthening **adaptation measures** to increase resilience and lower the region's vulnerability cannot be ignored. The scenarios analysis indicates that LAC is likely to continue to be the region with lowest carbon content of any regional energy mix through to 2050. However, current data are showing that the region's systems are already under pressure from changes in global climate, and these trends are expected to worsen. Andean glaciers, which provide vital water resources for millions of people, are shrinking; extreme stream flow is affecting communities; and an increase in the intensity and frequency of extreme weather events are affecting economies. In the Caribbean Basin, climate change contributes an additional US$1.4 billion to Average Annual Loss based on wind damage alone. In addition, climate change exacerbates many other driving forces and therefore amplifies environmental and related socio-economic impacts.

8. As a result of the range and growing intensity of many driving forces, important **ecosystems** and ecological processes in the region continue to be affected. Data indicate that although the rate of conversion of natural systems has begun to slow, the overall rate of loss of ecosystems remains high. Forests have shown an overall decrease of 9.4 per cent across the region since 1990, however this regional aggregate masks a noteworthy area of success - in the Caribbean, there has been an increase in the extent of forested area by 43 per cent over the 1990 baseline. Average coral cover is estimated to have declined in the Caribbean from 34.8 per cent to 16.3 per cent between 1970 and 2011. Species continue to be lost across LAC, and what is of particular concern is that where losses are occurring, the rate at which they are happening is, more often than not, increasing. Human-induced water erosion has been reported to affect as many as 2.23 million square kilometres of land in LAC, and river networks transport these sediments and other land-based sources of pollution to the oceans, impacting coastal ecosystems. The World's Water Quality Assessment (2016) states that about one-quarter of all river stretches in LAC are in the severe pollution class; and the number of rural people coming into contact with polluted surface waters is estimated to be as high as 25 million.

9. The future of the region's economies, as well as the ability of LAC countries to fight poverty and reverse inequality, depends heavily on the region's **natural capital** and the ability of governments to effectively manage it. Although there are noteworthy successes in the region's efforts to manage its natural asset base (e.g. between 1990 and 2014 the total terrestrial area under protection in the region increased from 8.8 per cent to 23.4 per cent); and LAC has made some important progress in addressing a number of high-priority socio-economic concerns (e.g. the percentage of people living below the poverty line decreased from 31 per cent in 2010 to 26 per cent in 2014; during the past 15 years, the percentage of people living in slums decreased from 29 to 20 per cent; and the number of people with improved access to water and sanitation has increased), the data in this report indicate that progress is likely taking place at the expense of the natural environment in many cases. Whether driven by the demands of a growing population;

fuelled by economic factors within or outside of LAC; or facilitated by the absence of effective governance structures, it is generally accepted that patterns of production and consumption within the region are currently unsustainable. These trends need to be addressed with urgency if LAC is to secure the well-being of its growing population.

10. In the context of the persistent challenges presented by the environment-development nexus, the Sustainable Development Goals, approved in September 2015, are considered an important opportunity by the governments of LAC as they go forward. The SDGs and the associated 2030 agenda landscape have a unique, interconnected nature which offers a more robust framework for the region's governments to identify key policy entry points and responses that will allow very specific actions with associated synergies, and consequently offer multiple benefits for environment and society. In this regard, there are a few important issues that Governments and other stakeholders in LAC may wish to consider.

11. Firstly, Governments will likely need to find innovative solutions to allow for the **decoupling** of economic growth and resource consumption. This will be critical for attending to many of the persistent anthropogenic activities that are driving environmental change. Current patterns of development, including production and consumption are, in many cases, unsustainable; and with future anticipated increases in population size, it will be necessary to ensure that needs can be met with minimal damage to the natural environment. Reducing dependence on fossil fuels, and diversifying energy sources, will also be important for countries of the region. One such area where this type of thinking would be critical is in the context of urbanization: cities provide the opportunity to improve access to health and education services, cultural facilities, and transportation. Investment in urban planning, such as through the better use of environmentally sound infrastructure and clean transport, can turn the urban challenge into opportunities for sustainable development in LAC.

12. The **scenarios** indicate that focusing on measures that ensure greater protection of the natural environment will not compromise economies or human well-being in adverse ways. Though some trade-offs may be necessary, issues such as poverty and health may be better managed where emphasis is placed on effectively managing environmental assets. Many governments of the region have engaged in some aspect of 'green economics' or green growth' and there are emerging strategies amongst countries to ensure a coordinated approach. Efforts such as these should be promoted and supported.

13. Governments of the region also likely need to invest in **ecosystem-based resilience** in order to reduce vulnerability and increase adaptation. Better investments in ecological infrastructure and implementation of measures to reduce pollution and other environmental pressures will help to safeguard some of the region's precious ecosystems and their services. This is especially important in the context of adapting to a changing climate, which is anticipated to have widespread and adverse impacts in the region.

14. The use of a range of policy support tools, mechanisms and approaches should help to boost regional success in addressing environmental changes and meeting the SDGs. Some of these include education and communication; the development of strategic partnerships especially within the region, but also beyond; innovation; proper monitoring and evaluation; effective implementation of policies and enforcement of laws; and adequate financing. As a core consideration of the sustainability agenda, governments of the region have also recognised the importance of improving the information base upon which environmental decisions are made. Greater investments into research, and building the necessary capacity for collecting and applying data to strengthen the science-policy interface, must therefore be a priority for the region.

15. Governments also have the opportunity to build on progress made in participation with various sectors of society, from the business sector to local and indigenous groups. Civil society has played a key role in the past decades by placing environmental concerns high on the political agenda. The challenge for governments is to integrate these viewpoints in an effective way, moving from informative

participation to a more productive dialogue that results in integrated planning and result-based management.

16. Stronger and focused **intergovernmental coordination** at the regional and sub-regional level will improve governance issues that are of regional priority. Understanding and action in areas such as data and information generation, climate change adaptation, water resource management, environment and health, sustainable production and consumption, and management of biodiversity will be strengthened with regional coordination.

17. The Latin America and the Caribbean region recognises the tremendous merit that is inherent in the overarching theme of GEO-6 'Healthy Planet, Healthy People'. At the Twentieth Meeting of the Forum of Ministers of LAC held in March 2016, governments of the region reaffirmed 'their commitment to comply with that stated in the 2030 Agenda for Sustainable Development, with the aim of eradicating poverty, protecting the environment and fostering inclusive, social and economic development in harmony with nature'. In keeping with this, a call was made 'to take coordinated and accelerated action at all levels to implement the environmental dimension of the 2030 Agenda, recognising the profound connections and the interdependent relationship that it has with the economic and social dimensions of sustainable development, in a balanced comprehensive manner, pursuant to our countries' policies and circumstances'. In this regard, the region can expect to see shifts in development pathways in the coming years that will put LAC countries further along the road to achieving greater sustainability, thus protecting the region's natural wealth.

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North America

1. The North American Regional Assessment was carried out in order to characterize the priority environmental issues, states and trends in the region in a systematic, evidence-based manner, as input into the sixth iteration of UNEP's Flagship Global Environmental Outlook (GEO-6) process.

2. Experts and government representatives identified regional priorities for North America at the Regional Environmental Information Network (REIN) conference held in Ottawa-Gatineau, 27-29 May 2015. These regional priorities have been used, in part, to inform and guide this regional assessment. This document provides a summary of key findings and policy messages emerging from the assessment.

3. Environmental conditions in North America have significantly improved over time due to investments in policies, institutions, data collection and assessment, and regulatory frameworks. However, in recent years environmental challenges have emerged that are proving harder to manage within existing policy frameworks. These challenges are the result of interactions across complex systems involving multiple pressures. They pose risks to human wellbeing and ecosystems that are novel in form and magnitude. Approaches to managing these problems that reduce systemic risk and steer sustainable transformations have emerged, generating evidence of their potential to respond to these new challenges.

Conditions have improved because of effective policies.

4. **Air quality** continues to improve in the region in response to concerted policy action in both countries and favorable trends in technology and energy markets. Regional, national, and local efforts to improve air quality are having substantial, measurable, and important public health benefits which have an estimated value on the order of $2 trillion. However, the improvements in air quality are not evenly distributed, with approximately 140 million people exposed to pollution above regulatory thresholds.

5. Legislation enacted in the early 1970s in North America has led to effective control of point sources of pollution to **surface waters** and delivery of **safe drinking water** to most communities in the region. However, legacy, persistent and emerging contamination continues to put pressure on water quality in some areas. In particular, diffuse sources of water pollutants, such as nutrients, remain a challenge.

6. **Drinking water** quality is generally extremely good, but shows signs of backsliding in some areas. Negative trends are chiefly the result of degraded infrastructure and weak governance. These isolated water quality incidents threaten human health, in some cases acutely.

7. North America's **land resources** are generally in good shape. A rich network of well-managed protected areas is in place and is helping to conserve biological diversity. Large-scale disruptive land use and land cover changes are kept in check by effective governance policies and regulations. However, natural landscapes are becoming more fragmented in some areas in response to both natural causes, such as wildfires and pest outbreaks, and decisions about land management activities, ownership transfers to heirs, and development, particularly at the intersection of the forest, agriculture, and energy sectors.

8. While progress has been made with many individual species, much **biodiversity** is at risk in North America. with increasing pressures from land use change, invasive species, climate change, and pollution affecting species, both on land and in the coastal marine

environment. However, regulatory approaches aimed at habitat protection show promise and biodiversity science is very advanced in the region. Continued efforts to integrate traditional ecological knowledge will further benefit conservation efforts.

9. **Chemicals and waste** show mixed trends. Issues arising from those that have been subject to policy focus over the past decades are declining significantly. Other sources, however, such as ash residue from coal scrubbers, abandoned mines, pharmaceuticals, and microplastics, are increasing and pose threats to human health and ecosystems.

In recent years environmental challenges have emerged that are proving harder to manage within existing policy frameworks.

10. **Climate change** is generating impacts across the region that affects diverse aspects of the environment as well as human health and well-being and, in some cases, human security. The potential for these impacts to worsen in both the near and long term is a priority issue for the region. However, the administrations of both countries are taking steps to mitigate impacts and adapt to those that are unavoidable. The US and Canada have agreed the two countries will play leadership role internationally in the low carbon global economy over the coming decades, including through science-based steps to protect the Arctic and its peoples, as well as, working together to implement the historic Paris Agreement.

11. **The Arctic** is an area of special concern because climate change impacts are most pronounced in the high latitudes and the risk of further significant change in the near term is growing. The Arctic's unique social, institutional, and ecological patterns make it highly vulnerable to continued climate change, especially in light of the difficulties it faces with regard to adaptation, which will trigger cascading risks.

12. The **energy system** is undergoing rapid changes, providing challenges and opportunities. Challenges arise from the externalities associated with aggressive hydrocarbon extraction methods. These externalities include the potential for increased air emissions, water use and induced seismicity. However, ongoing trends in renewable energy, rising efficiencies, and energy storage technologies are driving opportunities and demonstrating the potential to achieve a sustainable energy system.

13. **New chemical contaminants** and new sources of traditional pollutants are manifesting as emerging air and water quality problems that are of concern for public health and the environment.

14. **Water scarcity** is of increasing concern in the region. Water demand exceeds sustainable supply in the arid western areas of North America resulting in mining of aquifers, fragmentation and regulation of most western rivers through dams, and vulnerability of urban and rural communities to drought. Depletion of groundwater is exacerbated by a lack of groundwater governance mechanisms. Long-term droughts have accelerated water scarcity problems in some parts of the region, and climate change has most likely contributed to the severity, extent and duration of these droughts.

15. The **coastal and marine environment** is under increasing threat in the region, both from harmful trends regarding some traditional environmental pressures such as nutrient loads, as well as new pressures such as ocean acidification, ocean warming, sea level rise, and novel forms of marine debris.

16. **Freshwater fisheries** are well-regulated in the Great Lakes region and are generally controlled across North America, but face challenges due to factors such as climate change, population pressure, and pollution.

Solutions to environmental challenges in the region are emerging.

17. Efforts to **mitigate climate change** by reducing greenhouse gas emissions and enhancing carbon sequestration are beginning to show tangible results and to create a foundation for potentially major advances. Mitigation successes derive from a wide range of measures across the federal, regional and local levels of government and across the public and private sectors, including energy efficiency product standards; low-carbon electricity generation; transportation plans; building codes and standards; and other efforts. The December 2015 Paris climate agreement created a mechanism for all countries to coordinate national efforts and set more ambitious targets moving forward.

18. At the same time, governments, business and communities are taking action to **adapt to climate change**. For instance, Mayor Michael Bloomberg convened the New York City Panel on Climate Change (NPCC) in 2008 as part of the City's long-term sustainability plan. The NPCC engages scientists who study climate change and its impact, as well as legal, insurance, and risk management experts. The results of the panel's work offers examples for other communities to examine their own vulnerabilities and opportunities to enhance their capacities and resilience. Greater attention is also being given to strengthening and protecting green infrastructure.

19. **Natural Capital Accounting** (NCA) provides important tools to integrate natural resource, environmental, economic and social information to address systemic challenges faced by governments, [land and resource] managers, businesses and the public. NCA integrates this information into an accounts framework that is regularly updated to track transactions, identify trade-offs and reveal choices. It also helps to track and evaluate [program and policy] implementation and will reveal many of the unintended consequences of addressing complex systemic challenges. NCA is being implemented at three levels: national, ecosystem and enterprise. At the national level, water, energy and pollution accounts can be used to understand and improve resource use efficiency, inform allocation of scarce resources (for example, water) and reduce pollution. NCA ecosystem accounts provide a framework that managers can use to identify and track all types of ecosystem services, including regulating, supporting and cultural services, where valuation is a challenge. NCA also provides a framework to identify beneficiaries. Private sector early adopters are using NCA approaches to improve resource use efficiency, manage risks and reduce pollution.

20. **Sustainable Consumption and Production** brings together wide-ranging options for reducing environmental pressures by addressing drivers associated with manufacturing processes and consumer demand. These options have the potential to alleviate systemic pressure on the environment across the board, as demonstrated through successful innovations in areas such as water conservation, green building, reduction of packaging waste, and green procurement.

21. We find in the region evidence of heightened interest in approaches to **adaptive governance** that blend insights from disparate strands of innovation to create a repertoire of action that is enabling progress on the most difficult aspects of the sustainability challenge. This repertoire combines elements that have been on the policy agenda for some time, such as multi-stakeholder policy processes, with new ideas borrowed from resilience, inclusive governance, and system innovation. Progress at the sub-national and transnational levels on a variety of issues is ahead of bilateral federal collaboration.

22. North America is an energetic driver of the **Data Revolution**, with many proven examples of using environmental informatics and analytics to drive progress and many promising innovations under active development. These innovations combine commitments to regularly updated resource inventories and censuses with breakthroughs in sensor technology; open data practices; mobilization of diverse data communities; social science understanding of how information can drive effective responses; and quantum enhancements in networked information systems to contribute to a rapidly expanding set of responses to environmental challenges in the region.

The outlook for North America is a mixture of emerging possibilities and problems.

23. Advances in science and technology and systemic transformations offer hope for a more sustainable future.

24. Technological change regarding data and analytics is moving as fast as, if not faster than, the problems that concern the region, bringing with it **the promise to harness the power of the data revolution** to manage these problems.

25. Many technical and policy innovations that have been incubating for decades are starting to bear fruit or have advanced to the point where major adoption is within reach, and these **innovations offer the promise of systemic transformation** that could help reverse negative trends.

26. A few **North American cities and smaller communities are serving as living** laboratories, demonstrating how focused attention on pragmatic, coordinated improvements in systems spanning land use, transportation, public health, clean energy and water, and enhanced recycling and waste management can bend the curve toward enhanced resilience and sustainability to improve quality-of-life and lower social costs. Spreading these lessons learned to other communities throughout North America offers hope for creating more sustainable and resilient development pathways to the future. However, persistent environmental challenges remain.

27. Many **pressures are worsening, leading to deeper uncertainties and complexities** faster than policy responses are able to keep up.

28. Even for pressures that are moving in the right direction, such as carbon intensity, the **magnitude of improvement is not adequate** to meet mounting challenges.

29. A wide range of **potentially catastrophic impacts are built in** to the near and medium term climate, so that climate change impacts are highly likely to increase regardless of how fast the region reduces greenhouse gas emissions, and how fast it supports global emissions reductions. The consequences for human lives and livelihoods will depend on measures to adapt to climate change and increase resilience that, while showing signs of promise, are not yet sufficient to meet the threats. The region has been surprised by the emergence of major failures in traditional environmental issues such as drinking water safety, suggesting that past successes are in jeopardy.

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West Asia

1. The GEO-6 West Asia Regional Assessment[1,2] is guided by seven regional priorities: water, land, marine resources, biodiversity, air, climate change and waste management. These were identified by member States and stakeholders at the Regional Environmental Information Network (REIN) Conference held in Amman, 10-14 May 2015. Along with the identified regional priorities, 2 themes governed the West Asia assessment report; Peace, Security and Environment, along with the Food, Water and Energy nexus. This document provides a summary of key findings and policy messages.

2 **State and Trends of the West Asia Environment:** Following trends highlighted in previous editions of the GEO report series, the current analysis of drivers, pressures, state, impact aand responses of the West Asia environment, shows that a holistic and integrated approach is needed to identify challenges related to the environment and address the two themes. Several regional environmental challenges that are continuing include:

- Despite some efforts on integrated water resource management and the short lived solutions applied for managing increasing water demand, deteriorating water quality, in addition to persistent overexploitation of groundwater resources;
- Shared water resources continue to be a source of major regional concern due to lack of regional cooperation;
- Unsustainable consumption patterns threaten water, energy and food security;
- Biodiversity loss, desertification and ecosystem degradation are ongoing challenges;
- Air pollution continues to greatly impact human health and the environment;
- Waste management continues to be addressed through ad-hoc initiatives without an integrated waste management outlook;
- Energy efficiency and energy mix continue to be a priority; and
- The environment continues to be threatened by and a cause for lack of peace and security and increasing levels of conflicts.

3. The assessment report offers a visionary outlook scenario over the next 25 years, 10 years after achieving the Sustainable Development Goals. Adopting this positive vision, several outcomes can be achieved including; healthy people, clean water and good hygiene, green energy, responsible consumption and production, climate change impacts addressed, protected marine life and conserved land resources, regional cooperation ensuring peace, justice and security for all.

4. Policy options are needed to achieve the above scenario related to good governance, regional cooperation, data availability and sharing, capacity development and transitioning to inclusive green economy.

5. **Good governance** assuming multi level and pluralistic mechanisms in key areas including: transboundary cooperation, increased public participation in decision-making, cooperative financing, streamlining of data sharing and use as well as capitalising on partnerships with the private sector and civil society. Future efforts should focus on overcoming fragmentation and adoption of an integrated approach to Sustainable development. Full participation of all countries in Multilateral Environmental Agreements

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[1] In the context of the present document the term "West Asia" applies to the GCCs and Mashriq regions and Yemen.

[2] The GEO-6 West Asia Regional Assessment is one of a series of six UNEP regional assessments which will underpin the global GEO-6 assessment.

(MEAs) will require the implementation of commitments; addressing gaps in coverage of environmental policies; greater integration related to environmental social and economic policies and Strategic Environmental Assessments (SEA) corresponding to the global Integrated Environmental Assessment (IEA) frameworks.

5. **Data collection, processing and sharing** at both regional and national levels enable a needed infrastructure to measure progress. Research and development, coupled with science-based decision making to provide leverage for informed policies. The 2030 Agenda for Sustainable Development presents an opportunity of focused strategies for successful transition. Redefining the measures of progress to reflect ecosystem wellbeing is an important part of this. National Information Systems will further support assessment and evidence-based policy making.

6. Building **knowledge-based societies** at the national and regional levels that leverage the social capital and youth capacity to develop the required capacity and provide new job opportunities in the context of inclusive green economy. Opportunities for economic diversification in West Asia using sustainable consumption and production, green and circular economy principals present sustainable pathways to sustainable human development. Some of these opportunities are:

   - Scaling up successful regional food-water-energy initiatives that will ensure food waste reduction, sustainable agriculture and carbon neutral sectors.
   - Mega-renewable energy projects and energy efficiency initiatives that are already being implemented in West Asia show promising results in terms of economic payoff and good environmental outcome.
   - Sustainable transportation and building sectors provide additional economic diversification opportunities environmental and health benefits.

7. Addressing interconnected **vulnerabilities i**n an effective sustainable socio-economic and environmental policies will reduce the impact of climate change and natural hazards including drought, dust storms and flash floods, and maintain good environmental health.

8. Institutionalizing these types of policies and regulatory frameworks can be captured in **ripple effects** across different sectors and lead to greater well-being of society in West Asia.

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