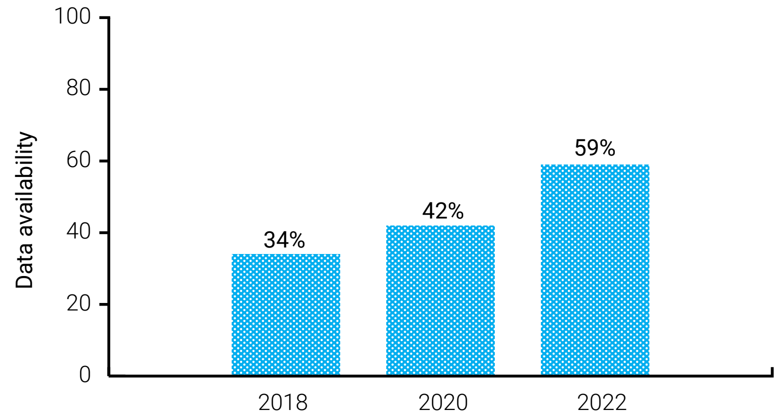
Executive Summary

The United Nations Environment Programme's (UNEP) Measuring Progress series of reports provides an overview of the progress made in data availability for the 92 environment-related Sustainable Development Goal (SDG) indicators, coupled with improvement or degradation in the trend of each indicator. It also explores the potential and limitations of using statistical analysis to demonstrate interlinkages between indicator pairs to better inform policymakers of the synergies and trade-offs between SDGs. The indicators are divided into four categories: (i) state of the environment, (ii) drivers of change, (iii) state of human well-being and (iv) socioeconomic and environmental factors. This report explores the use of multivariate statistical analysis using water-related ecosystems (freshwater and marine) as an example of the utility of this approach to explore how ecosystems are impacted by drivers, pressures and actions at multiple scales.

Substantial improvement in global data availability

Global analysis of the progress of the 92 environment-related SDG indicators demonstrates an improvement in data availability, resulting from additional data being reported by countries leading to the availability of sufficient data to aggregate at regional and global levels. In 2022, the environment-related SDG indicators with sufficient data to analyse were estimated at 59 per cent, up from 42 per cent in 2020 and 34 per cent in 2018. Indicators with more data available are mostly found in SDG 6 on freshwater, SDG 7 on energy, SDG 12 on sustainable consumption and production, SDG 13 on climate change, SDG 14 on life below water and SDG 15 on life on land, with the most improvement in data availability reported in the Latin America and Caribbean, Northern Africa, and Europe regions.

Figure ES.1 Percentage of SDG environment-related indicators with sufficient data for analysis of progress



This major improvement in data availability results from a sustained investment by countries in their national statistical systems to collect and report data for SDG indicators as part of their sustainable development programmes, supported by capacity development efforts by custodian agencies.

The further development of methodologies that use new data sources also contributes to improved data availability. Many national statistical offices (NSOs) are already experimenting with using big data in the production of official statistics. Currently, the dominant big data types include Earth Observation (EO) data, citizen science data and other sensor network data, combined with advanced analytical techniques (e.g. machine learning, geospatial modelling and geostatistical modelling).

Figure ES.2 Environment-related SDG indicators data trend, global level

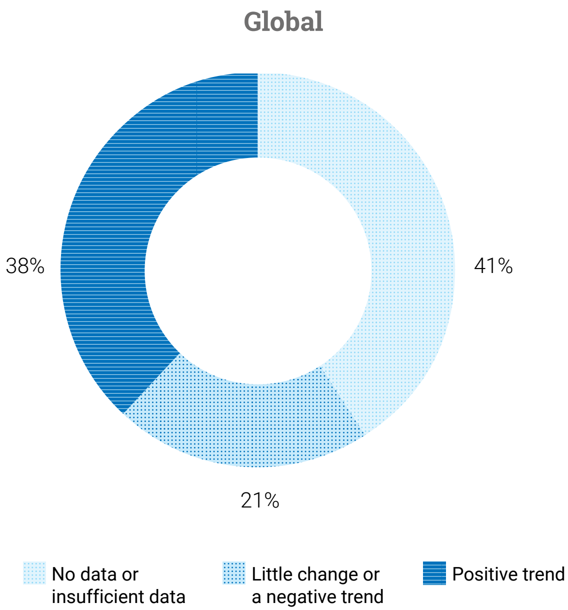
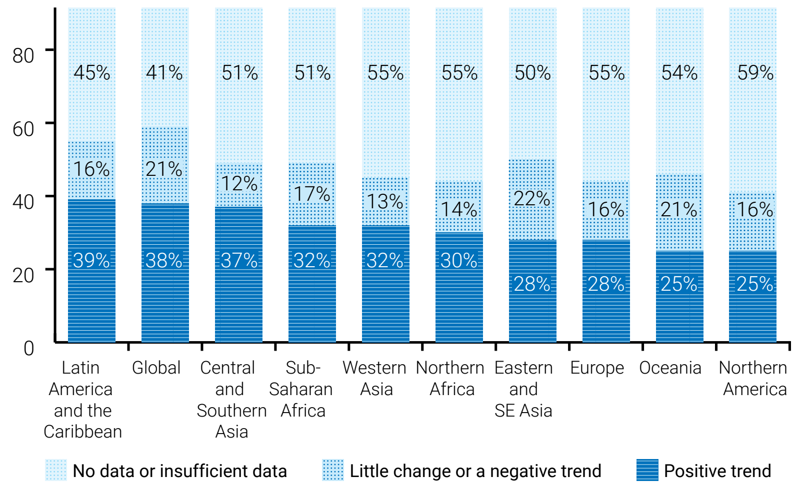


Figure ES.3 Environment-related SDG indicators data trend, global and regional levels



Status of environment-related SDG indicators

In 2022, at the global level 38 per cent of the 92 environment-related indicators showed positive change, indicating environmental improvement, and 21 per cent showed little or **negative change**. The most indicators showing positive trends were those related to SDG 9 on infrastructure, SDG 7 on energy and SDG 6 on freshwater.

The regions with the highest proportion of SDG environment-related indicators showing environmental improvement are the Latin America and the Caribbean region (39 per cent) and the Central and Southern Asia subregion (38 per cent). The regions with the lowest proportion of indicators showing environmental degradation are Central and Southern Asia (12 per cent), Western Asia (13 per cent) and Northern Africa (14 per cent).

While measuring the progress of the 92 environment-related SDG indicators focuses on evaluating trends, it does not assess the magnitude of the trends or progress towards meeting targets associated with specific indicators.

Advancing statistical methods for identifying interlinkages

This report advances the statistical methods to better assess and understand the interlinkages between pairs of indicators through the use of multivariate statistical analysis. This builds on the methods used in the previous report, Measuring Progress: Environment and the SDGs, which explored the use of correlation analysis to identify the interlinkages between pairs of indicators. Based on the driver-pressure-state-impact-response (DPSIR) framework, the analysis identifies how one state of the environment indicator is relates to indicators of a multitude of drivers of change as well as socioeconomic and environmental factors. The statistical analysis focuses on freshwater- and marine-related ecosystems and is conducted at the global, national (Colombia and Mongolia) and basin (Poyang basin, China) levels.

Global policy discussions benefit from new analytical approaches to understanding the underlying interlinkages and drivers of indicator trends. The analytical approach used has the potential to contribute to a more policy-relevant integrated analysis. The analysis confirmed many known interlinkages between freshwater- and marine-related ecosystems and variable drivers. It also identified several new interlinkages that cannot be easily explained with the existing literature, requiring further investigation to identify whether these are covariates or newly identified drivers. Consideration of these new drivers may be highly relevant to the development of new innovative policies to protect these ecosystems.

Evaluating indicators at the national level provides a more comprehensive and actionable interpretation of key interlinkages than at the global level, but global-level trends remain critical to assessing overall progress in achieving the SDGs. A unique aspect of the analysis is the inclusion of both global-level and national-level interlinkages. While some interlinkages were detected at both scales, others were only identified at the more granular national scale. The various positive and negative relationships identified between the state of the ecosystem, direct drivers of change, state of human well-being, and socioeconomic and environmental factors highlight the importance of considering the impact of indirectly related factors. While some impacting factors are common in global and national settings, identifying other national factors considered to have synergies or trade-offs with water-related ecosystems is imperative to inform the development of targeted policies and interventions to protect these ecosystems.

Findings for freshwater- and marine-related ecosystems

The analysis identified strong interlinkages related to policies that integrate land and water conservation, ensure suitable water infrastructure in urban areas, provide mitigation of pollution and address impacts from water withdrawals associated with economic activity. The analysis revealed mostly examples of relationships consistent with published evidence and intuition. For example, population living in urban areas was found to be positively interlinked to a decline in marine-related ecosystem indicators, confirming the impact of effluents from large cities on the eutrophication of coastal areas.

The inclusion of global and national levels in the statistical analysis provided an opportunity to verify global interlinkages with national case studies and highlight the impact of data disaggregation. For instance, conservation efforts were consistently positively interlinked with freshwater-related ecosystem indicators at both levels, while water-use efficiency indicators were interlinked with freshwater-related ecosystems only at the national level.

Recommendations

The analytical approach has exposed some of the critical data gaps in water-related ecosystems and has challenged the suitability of some indicators to detect meaningful change in the health of freshwater- and marine-related ecosystems. The freshwater-related ecosystem assessment was limited to interlinkages between various metrics of the area of freshwater in each country. Similarly, the lack of disaggregated catchment-level data constrained the ability to meaningfully assess coastal ecosystems. While these data sets benefit from the ability to provide consistent measurement using remote sensing across the globe, they are limited in their ability to measure the water quality, volumes or ecosystem health of waterbodies. There may be opportunities to further utilize citizen science, satellite imagery, low-cost in situ monitoring and big data to produce measures of water quality and/or volume within various waterbodies.

It is critical that the successes of the SDG indicator framework be translated into disaggregated data capable of informing subnational policies while maintaining compatibility at a global scale. Data and indicators are key for informed decision-making and policy design to know how realistic options are, what inconsistencies might result from decisions, how the cost of such inconsistencies can be mitigated and how trade-offs can be explained. Considering that most environmental policies, including water policies, are developed at the national or subnational scale, disaggregated data is needed to inform policy.

Re-evaluating the suitability of the current indicator methodologies to parse true change in the environment from data and methodological artefacts is needed to bolster data collection for other environment-related indicators. Moreover, the analysis revealed the importance of incorporating more ecologically relevant spatial groupings. Catchment-based or ecosystem-based aggregations may provide more insight into the ecological dimension of many of the interlinkages identified for freshwater- and marine-related ecosystems. However, methods and tools used are expected to be developed concomitantly to facilitate actionable use of data by policymakers working within political or geographical boundaries.

A fuller understanding of SDG interlinkages will ultimately allow for the design of more effective policy responses. For example, integrated water resources management is an optimal policy response that requires the incorporation of scientific analysis of the most relevant external drivers of ecosystem and resource issues, a comprehensive planning approach as well as a traditional approach that focuses on stakeholder input. This is critical to achieving policy coherence and recommendations that are both policy relevant and scientifically defensible.

Sustainable development and the 2030 Agenda can only be achieved through an all-sectoral approach that integrates environment-related indicator trends with robust policy analyses. Its interlinked nature calls for policy coherence for sustainable development through an integrated approach to ensure the production of complementary policies and the avoidance of trade-offs.