



GEMS/Air Strategy

Version.1.2022



Executive Summary

This document outlines a strategy to guide the operations and workplan development of the UNEP's Global Environment Monitoring System for Air (GEMS/Air) Programme. It takes into consideration the Programme's developments since its inception in 1970 and lessons learned on scalability and sustainability – the renewed GEMS/Air places partnerships, innovation, and scalability at the forefront of its programme.

Air pollution is a significant environmental risk factor to health. Each year, approximately 7 million premature deaths are attributed to air pollution with huge economic consequences – estimates indicate \$5 trillion in welfare losses and \$255 billion in lost income¹. Furthermore, air pollution contributes to climate change, which is detrimental to ecosystems and human wellbeing, impacts visibility, and threatens food and water security. However, in a report by First Global Assessment of Air Pollution Legislation (GAAPL), experience in some countries around the world provides clear evidence that air pollution can be successfully reduced through well-informed policies, with health and economic benefits². Scientific understanding is an essential ingredient for the design of successful policy interventions, but knowledge and data relevant for effective policies is often inadequate or absent in many areas of the world where it is needed. Air quality forecasting and information systems with observational and modelling components are key elements for adaptive and mitigation measures to reduce the negative impacts of air pollution. Short-term measures include early warning services for hazardous air pollution events or the prediction of the effectiveness of vehicular traffic control. Long-term air quality information is essential for implementing cost-effective emission reduction strategies and local planning to ensure compliance with air quality standards.

The UN Environment Assembly³ strengthened the organization's mandate to support countries, especially developing countries, to better manage air quality.

¹ World Bank (2016). "Air Pollution Deaths Cost Global Economy US\$225 Billion."

² UNEP (2021). "Regulating Air Quality: The First Global Assessment of Air Pollution Legislation."

³ See Annex I - UNEP/EA.3/Res.8 and UNEP/EA.1/Res.7.



The global air quality challenge covers a broad variety of scales in spatial and temporal terms as well as in the context of actors involved. Focus on these dimensions, call for a broad, participatory, dynamic, and demand-oriented approach which can rely on a multidisciplinary expert and user community. In addressing the global air pollution challenge, this strategy proposes an agile approach to catalyze transformative change in the operational framework of GEMS/Air. It applies an innovative approach for formulating a revitalized GEMS/Air Programme.

Allied with this new approach is the formation of a Consortium for Better Air Quality data (CBAQd). This is a community of practice that pools expertise, offering an efficient mechanism to identify and scale capacities, know-how and best practices that have the potential to bring about changes to improve air quality.

By feeding into the work of the CBAQd and deriving benefits from the collective knowledge of the consortium, GEMS/Air intends to maximize synergies with the global multi-stakeholder community. This approach will enable GEMS/Air to be instrumental in creating a baseline of air quality monitoring from global to local scale and, by connecting through the CBAQd to its members that include governments, private sector, space agencies and earth observation services, UN, Academia, non-state actors, civil society, international development agencies, philanthropic organizations and so on.

This strategy is a living document that will evolve as needs are validated. It will rely on active engagement, adequate financial support, communications, and regular updates of operational workplans for annual approval. Its implementation adopts a project modality in line with UNEP's programme implementation norms. The active digital presence of all activities, including the strategy is accessible [online](#)



Acknowledgement

We are grateful for the constructive feedback and written comments provided by many of our partners that contributed to developing this strategy. Particular thanks to; AirQo, C40 Cities Climate Leadership Group, Clean Air Fund (CAF), Climate and Clean Air Coalition (CCAC), Environmental Defense Fund (EDF), European Union (EU), Hebei Sailhero Environmental Protection High-Tech Co Ltd (SailHero Inc), IQAir, Kunak Technologies S.L., Stockholm Environment Institute (SEI), United Nations Children’s Fund (UNICEF), World Bank Group and World Resources Institute (WRI).



CLIMATE &
CLEAN AIR
COALITION
TO REDUCE SHORT-LIVED
CLIMATE POLLUTANTS



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WORLD
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Vision

GEMS/Air catalyzes scalable innovation using science and technology know-how, to enable developing country governments to drive transformation that improve the air their citizens breathe.

Approach

The GEMS/Air vision is the foundation on which the programme is anchored. It defines the primary target group (i.e., developing country governments) and reliance on science and technology. **Figure 1** summarizes the partnerships, processes, work packages, key actors and stakeholders that will collectively drive transformation to implement this vision.

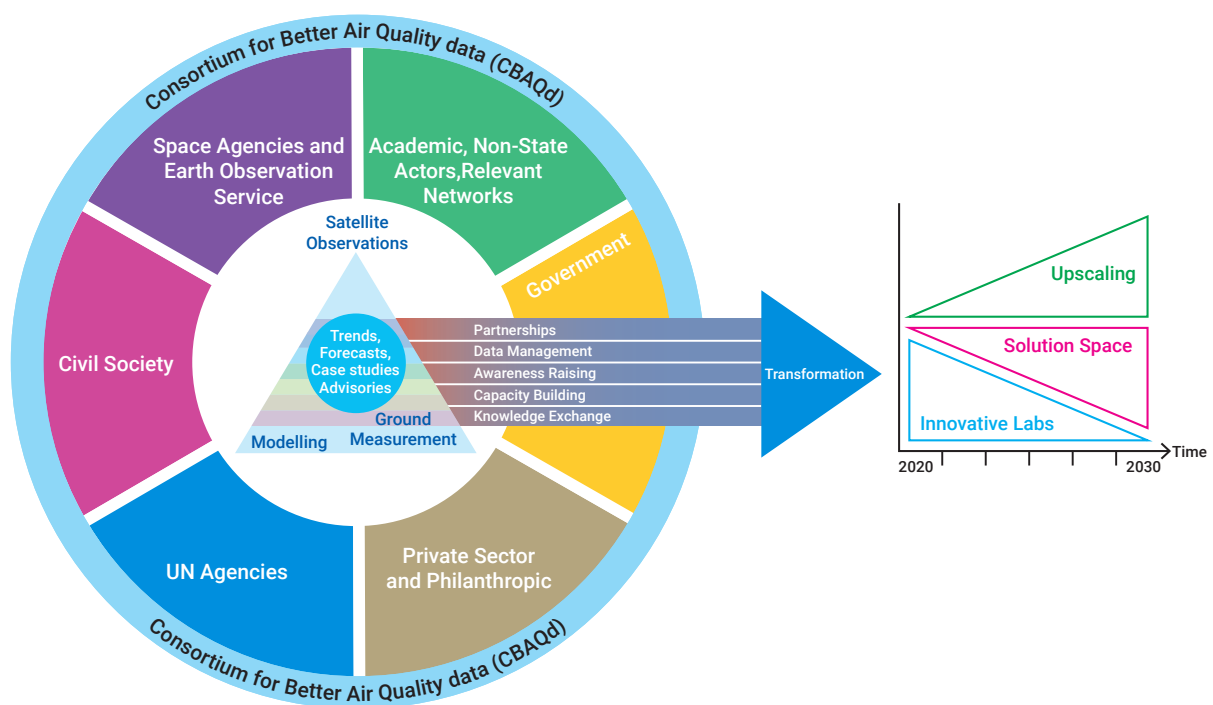
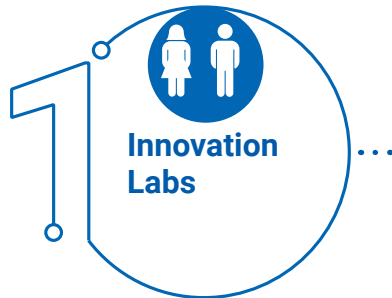


Figure 1: The GEMS/Air programme encapsulated in a single illustration describing the value chain for transformation including processes, services and key actors and stakeholders.

Strategic Approach

GEMS/Air is designed around three strategic actions



Innovation labs are executed through pilot projects. These can include validating market interests related to investment in monitoring or assessing how low-cost sensors meet the use case of interested countries. Innovation labs of the current GEMS/Air portfolio have focused on the application of low-cost sensors. However, going forward it will include the application of satellite surface estimates for pollution hotspots or the utility of re-analysis, or application of non-tradition business models to sustain monitoring through private sector engagement and marketing. Innovation labs are not research projects, they are experiments with beneficiaries, that are meant to seed innovative approaches to problem solving at local and national level.



Within a defined context, innovation labs inform the solution space by providing insight towards solutions that can be upscaled, replicated and adapted in similar context. An example of a solution space is the launch of the [real-time interactive map that provides estimates of PM2.5 globally](#). It reaches over 50 million users through its mobile phone app and attracts more than 300 million users annually to our partner website (IQAir). This platform demonstrates the potential of a strong partnership with IQAir to maximize reach with IQAir to maximize reach and **crowd source** air quality of air quality data for PM2.5 to support advocacy efforts at scale.



An optimal approach to catalyzing action is to reduce duplication, combine efforts and leverage shared knowledge. The creation of the global consortium for better air quality data (CBAQd) is a key element of this strategy that will facilitate implementing scalable solutions. It is designed around convening communities of academia, practice, policy makers, non-state actors, private sector and financing entities, to improve coordination and collaboration towards a common agenda.

GEMS/Air serves as the secretariat for the CBAQd, manages membership as well as facilitating open exchanges through bilateral and regional platforms in addition to co-development of interventions.

The collective expertise of the CBAQd, is envisioned to support the function of the solution space by vetting ideas to appraise those that have scaling potential.



Work Packages

Cognizant of the need to encourage global, regional and national actions on air pollution, [UNEA Resolution UNEP/EA.3/Res.8](#), strengthened the mandate of UNEP to lead efforts to enhance regional cooperation, develop a platform for information-sharing, and to support countries to better monitor air quality and, design strategies and policies to reduce, and prevent air pollution.

This strategy aims at empowering governments and other stakeholders to make evidence-based decisions through increased access and use of air quality data. To achieve this goal, developing country governments at all levels will benefit from improved capacity for air quality management, utilization of monitoring data, tools, and knowledge sharing opportunities. GEMS/Air will provide a mix of these services and work packages with a top-down (i.e., policy makers) and bottom-up (i.e., public advocacy) focus. GEMS/Air, while given its mandate by national governments, plans to focus its implementation at the urban scale with a view of upscaling.

This is a deliberate departure of the previous programme approach. The work packages of GEMS/Air, stresses the demonstration of successes in a short time frame and seeds replication by inspiring and facilitating collaboration with partners.

To deliver its strategic goal, the GEMS/Air Programme is anchored around work packages that facilitate air quality management services (AQM) to countries.

Our approach below describes the relation between the different elements of this strategy



Partnership development will be derived primarily by the CBAQd and driven through bilateral and multilateral arrangements. The implementation of the CBAQd is to be developed through an Expression of Interest (EOI) and survey, targeting a broad range of actors covering all aspects of air quality management (e.g., training, modelling, policy, etc.), supporting functions (e.g., big data analytics) and sectors (e.g., health, education, private and public sectors).



An open Data Management System (oDMS) will be developed and hosted by UNEP to strengthen data sharing, access to historical data and quality assurance.

This will also involve developing partnerships across the air quality management landscape, including instrument suppliers, data collection, data management and visualization expertise.



Policy development and behavior change are at the heart of the GEMS/Air strategy and a central element in any transformation process. The strategic approach aims to design activities to improve reach and feedback from all levels of society on air pollution and explore ways to leverage social media channels. A large portion of this work relies on guidance from UNEP's Communication Division that provides linkages with media, and digital channels of communication. Awareness raising, like all other activities of this strategy, are not stand-alone activities but weaved into the achievements of outcomes of the GEMS/Air project portfolio.



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Targeted training (in-person or virtual), compilations and production of guidance materials about air quality management and analysis are implemented under the umbrella of capacity development. These are embedded in a project modality to support the project objective(s) and facilitate adequate funding for post activity follow up. It is aimed at enhancing the knowledge base of targeted governments, depending on their needs. Innovation labs go hand in hand with capacity development activities by providing use cases to apply knowledge. GEMS/Air will develop capacity through the implementation of activities stemming from this strategy. It aims to instill purpose through targeted training and encourage practical application by its beneficiaries to reinforce built capacity and uptake. Capacity development continues to be a significant need of many countries for which the strategy aims to put in place a platform to maximize and sustain efforts to improve air quality management across the portfolio of initiatives.



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Knowledge exchange represents an informal modality to learn, seed ideas and combine efforts. GEMS/Air aims to contribute to knowledge exchanges by leveraging existing global and regional networks and partnerships that encourage peer-to-peer learning, co-design and synergy, to enhance capacity to manage air quality. These include sponsorship and participation in global events like the Better Air Quality Conference series, convening regional air quality fora, or leveraging platforms such as the UNEP Science Policy Business Forum series to engage with non-traditional actors to improve air quality globally.



Resource Mobilization

Resource mobilization to implement GEMS/Air strategy is centered but not limited to funding from Member States through the UNEP work programme, and funding through mechanisms like the Clean Air Fund (CAF), the Green Climate Fund (GCF), Global Environment Facility (GEF), European Union (EU) and so on, that utilize a project modality. In addition, the partnership process of the strategy implementation aims to develop partnerships with the private sector to complement planned activities with seed funding or in-kind contributions (e.g., infrastructure and logistical support) and cash contributions where possible.

Implementation of the Strategic Plan

The strategy will be implemented with an immediate focus on creation and operationalization of the Consortium for Better Air Quality data (CBAQd), outreach, capacity building and mobilization of countries, sub-regions, partners and resources for implementation of priorities. Following the creation of a governance structure and development of an annual work plan that is aligned with the [UNEP Medium Term Strategy](#) (MTS) input from the consortium will help guide and prioritize activities to be coordinated through GEMS/Air.



Monitoring and Evaluation of the Strategy Implementation

The GEMS/Air Programme Manager will have the overall responsibility for monitoring and evaluating the implementation of the strategy and associated plans. It is proposed that monitoring and evaluation reports be compiled for an annual meeting of the GEMS/Air Advisory Group (to be created) and used as the main reporting tool for tracking progress on implementation. The Advisory Group for GEMS/Air will be a voluntary group with rotating membership that provides advice to improve coordination, participation, synergy with other organizations and further the development of the CBAQd. The inaugural membership of the Advisory Group and modalities for succeeding membership will be decided upon during the first meeting of CBAQd.

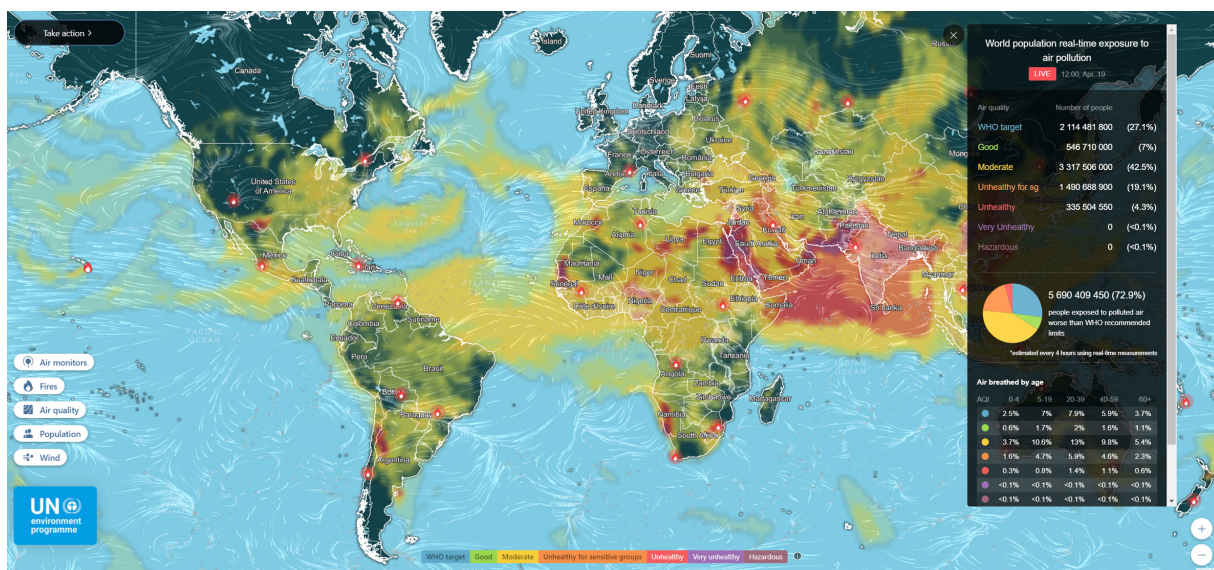


Figure 2: UNEP /IQAIR real-time, crowd sourced, interactive for PM2.5



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<https://www.unep.org/explore-topics/air/what-we-do/monitoring-air-quality>