

Summary of the Second Global Session of the UN Science-Policy-Business Forum on the Environment: 8-10 March 2019

The Second Global Session of the UN Science-Policy-Business Forum on the Environment (SPBF-2) convened from 8-10 March 2019 at the UN Environment Programme (UNEP) headquarters, Nairobi, Kenya, ahead of the fourth session of the UN Environment Assembly (UNEA-4). In support of the UNEA-4 theme of “Innovative Solutions for Environmental Challenges and Sustainable Consumption and Production,” SPBF-2 focused on the nexus of science, innovation and entrepreneurship for the environment.

On 8 March, closed consultations were held, bringing together representatives of the science, business and policy communities to assess progress, identify key areas of focus, and jointly develop an agenda for moving forward on priority issues, including big data, citizen science and green technology.

From 9-10 March, approximately 1,500 delegates took part in more than 40 parallel discussion sessions, covering the following six key streams:

- Science for Shaping Green Policies and Market Responses;
- Big Data: Towards a Digital Platform for our Planet;
- Smarter, Greener Solutions for Cities;
- Green Technology Startup Initiative;
- Climate Challenge: Finance, Market and Non-State Actors; and
- Sustainable Food for a Healthy Planet.

A special plenary session took place on both days to showcase the latest developments on core themes at the Forum. On Saturday, an IBM-hosted session addressed the theme, “Fast Tracking the Sustainable Development Goals (SDGs) Using Frontier Technologies,” and included demonstrations of planetary data systems.

On Sunday, “The GreenTech Startup Marathon” provided an opportunity for green startup companies to pitch their ideas on groundbreaking innovations to address global environmental challenges.

SPBF-2 concluded with an overview of messages and recommendations gathered from the six thematic streams that highlighted priorities for action, such as: the need for more ambition on energy efficiency and mitigation; establishing new business models to drive the circular economy; and focusing on resource efficiency to decouple economic growth from biodiversity and ecosystem services loss.



View of the opening plenary

The Citizen Science Global Partnership delivered a closing statement, underscoring how citizen science engages ordinary citizens in the delivery of quality data that helps drive behavior change and supports the achievement of the SDGs.

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The Forum saw the launch of a Working Group on Big Data on the environment, with participation of major partners including Space Agencies, research institutes, earth observation institutes, UN agencies and the world of technology.

SPBF-2 ended on a somber note as delegates reflected on the many lives lost in the Ethiopian Airlines crash on Sunday, 10 March 2019, some of whom were en-route to Nairobi to attend the opening of UNEA-4.

A Brief History of the UN Science-Policy-Business Forum

Launched at UNEA-3 in December 2017, the UN Science-Policy-Business Forum on the Environment is a framework designed to catalyze a more dynamic interface between science, policy, business and society. The Forum aims to facilitate multi-stakeholder platforms to identify and promote opportunities for green investment that are driven by advances in science and technology, empowering policies and innovative financing. It also seeks to function as an accelerator and incubator of innovation and positive change to achieve the SDGs.

The Forum brings together more than 2,000 organizations around the world to:

- facilitate issue-based consultations and building of communities of practice around key themes, bringing together top scientists, policy makers, citizen science groups and the business sector;
- showcase positive impacts of transformative green solutions and technologies, and take stock of the policies and investments required to scale up successful models; and
- contribute to UNEA, the UN High Level Political Forum and other global forums to enhance decision-making and inform future visions on the environment.

The first Global Session of the Forum took place from 2-3 December 2017 during UNEA-3 in Nairobi.

Report of the Forum

Opening of the Forum

Opening Statements: On Saturday morning, Joyce Msuya, Deputy Executive Director, UNEP, welcomed Forum participants to Nairobi. She encouraged the Forum to identify ways it can play a part in stimulating collective actions for sustainable solutions, noting that the SDGs cannot be achieved without technology and integrated data to influence behavior change.

Xie ZhenHua, Special Representative for Climate Change Affairs, China, called for integrated planning to create economic opportunities to protect biodiversity and



Joyce Msuya, Deputy Executive Director, UNEP

stimulate climate action. He shared experiences in China of encouraging a low-carbon pathway of development, and highlighted that clear policy signals encourage green technology and innovation.

Siim Kiisler, UNEA-4 President and Minister of Environment, Estonia, said “innovation in isolation is not enough” and stressed the importance of science, policy and business innovation. He noted the opportunity for a greentech startup partnership and highlighted that the two most important outcomes of UNEA-4 may be commitments on single use plastics and environmental data.

Keriako Tobiko, Cabinet Secretary for Environment and Forestry, Kenya, stressed the importance of innovation to achieve the SDGs and outlined his country’s legislative framework for climate action, noting that the Climate Change Action Plan for 2018-2022 has been finalized. He described how Kenya is developing a smart city which will serve as a strategic hub for innovation and growth of the greentech sector. Emphasizing that energy security requires an interface between science, policy, and business, Tobiko said that Kenya is on the verge of a green transformation, with renewable energy now surpassing diesel-generated energy.

“Mini Ted Talks” on Forum Themes: HRH Princess Laurentien of the Netherlands, introduced the Society of Entrepreneurs and Ecology (SEE), 800 top Chinese businesses dedicated to advancing corporate social responsibility, who have committed themselves to banning the use of rhinoceros-based products. She called for businesses and other stakeholders to disrupt the global supply chains that are enabling illegal wildlife trafficking, by sharing intelligence, developing a strategic implementation plan and establishing formal and informal networks.

Janez Potočnik, Co-Chair, UNEP International Resource Panel (IRP), focused on sustainable consumption and production, calling for decoupling natural resource use from economic growth. He said the IRP’s Global Resources Outlook (GRO) 2019 emulates the Intergovernmental Panel on Climate Change (IPCC) assessment reports, providing an overview of recent natural resource management and estimates for the future.



HRH Princess Laurentien of the Netherlands



Rhian-Mari Thomas, Chair, Green Banking Council, Barclays

Speaking on the role of non-state actors in combating climate change, Pavel Kabat, Chief Scientist, World Meteorological Organization (WMO), said in some cases, damage from climate change equals about 20% of countries' national gross domestic product. Asking why international agreements have not yet achieved sustainable development, he called for partnerships among all relevant sectors to "figure out where to begin, produce a pathway to success, then develop a strategy for getting there."

On innovative green finance for a green planet, Rhian-Mari Thomas, Chair, Green Banking Council, Barclays, highlighted that one of the greatest barriers to green finance is the lack of pipelines of bankable and investible green projects. Noting that there is "no green policy bullet," she described how the UK's offshore wind market is almost entirely funded by private capital.

Wayne Balta, Vice President of Corporate Environmental Affairs and Product Safety, IBM, discussed the proliferation of new forms of data and new tools used to extract value from these data, such as the internet of things, analytic software, machine learning, natural language processing and block chain. He stressed the need to increasingly apply these tools to environmental and sustainability problems.

Ai Luming, Chairman, Society of Entrepreneurs and Ecology, highlighted support for businesses and NGOs for the protection of the environment in China. On the protection of nature and ecosystems, Zhang Xincheng, President, IUCN, highlighted the need for all stakeholders to work together for integrated and sustainable nature-based solutions to global environmental challenges.

Jonathan Everhart, CEO, Global ReEnergy, said global startups are leading a fourth industrial revolution. He noted that green entrepreneurs, particularly small to medium-sized enterprises (SMEs), can drive this transformation but frequently face financing constraints. He called on conference participants to work with the global green technology hub to bridge this gap.

Jian Liu, Chief Scientist, UNEP, concluded the session, encouraging participants to be leaders in their fields, to find and achieve solutions.

Panel on The Race to a Clean Energy future: This high-level panel brought together Liu Zhenya, President, Global

Energy Interconnection Development and Cooperation Organization (GEIDCO), China; Akiko Seyoum Ambaye, CEO, Orchid Business Group, Ethiopia; Harry Verhaar, Head, Global Public and Government Affairs, Signify (formerly known as Philips Lighting); and Steven Kukoda, Vice President, International Copper Association.

On future pathways, Zhenya reiterated the need to provide innovative solutions to systematically address sustainability challenges and stimulate ecological restoration, and to form new partnerships to bridge industry internationally. Ambaye underscored the importance of technology transfer in partnerships between private and public sectors.

Verhaar expressed the need to be ambitious and shared his company's goal to be carbon neutral by 2020, illustrating the multiple benefits of new technologies such as LED lighting in cities. Kukoda said the private sector does not need to develop new technologies for energy efficiency; rather, government needs to close the gap by incentivizing change through policy signals.

Thematic Stream 1: Science for Shaping Green Policies and Market Responses

Environmental and Health Impacts - Messages from the Sixth Global Environment Outlook (GEO-6): Energy systems: This session took place on Saturday morning and was chaired by Pierre Boileau, Head of GEO-6 Unit, UNEP.

A first panel on GEO-6 messages included: Paolo Soprano, Co-Chair, High-level Group, GEO-6; Yi Huang, Co-Chair, High-level Group, GEO-6; Joyeeta Gupta, Co-Chair, GEO-6 Assessment; Paul Ekins, Co-Chair, GEO-6 Assessment; and Abdallah Mokssit, Secretary, IPCC.

Panelists involved in the GEO-6 process outlined the assessment approach and work programme, noting that the official launch of GEO-6 is scheduled for Wednesday, 13 March 2019, subject to approval by UNEA-4. Highlighting some of the key findings, panelists discussed how GEO-6 draws attention to the connection between environmental and human health, highlighting, among other results: an unhealthy planet as the cause of 25% of death and morbidity; drivers of an unhealthy planet such as current models of economic growth; the impacts of an unhealthy planet; the importance of environmental policy



Yi Huang, Co-Chair, High-level Group, GEO-6



L-R: **Erica Key**, Belmont Forum; **Phethiwe Matutu**, National Research Foundation, South Africa; **Makyba Charles-Ayind**, American Academy for the Advancement of Science; and **Nelson Torto**, African Academy of Sciences

innovation, effectiveness and monitoring; and the relevance of GEO-6 concepts and activities for the IPCC sixth assessment cycle.

A second panel discussion that addressed environment and health impacts of energy systems included: Pavel Kabat, Chief Scientist, WMO; Cristina Guerreiro, Norwegian Institute for Air Research; Oswaldo Lucon, University of São Paulo; and NH Ravindranath, Vice-Chair of the Scientific Advisory Panel, IPCC. The discussions highlighted a number of climate-health issues, including: convincing policy makers there must be co-benefits and synergies; health burdens due to air pollution, such as the impact of household burning of solid fuels; and the challenge of addressing environmentally harmful subsidies. Panelists stressed the need to rapidly reduce the use of fossil fuels and shift to cleaner energy sources.

Advancing the African Science Enterprise: Investment in Research in Africa: This session on Saturday morning was organized by the Belmont Forum. Opening the session, Erica Key, Executive Director, Belmont Forum, identified their goal of better representing diversity and becoming more inclusive in order to effectively address a range of environmental challenges.

Panelists outlined the current funding landscape for African research, highlighting the need to, *inter alia*, facilitate access to global resources, build capacity, change behaviors, and ensure that knowledge produced by science and research actually leads to policy formation and innovation.

The panel underscored significant challenges, such as: harmonizing data at the regional level; strengthening linkages with the private sector to address priorities of sustainable development; and translating knowledge into opportunities for behavior change.

One panelist identified development planning processes as a key constraint to promoting a more transformative agenda, stating that “it could be easier to change the constitution than a national development plan.” Other issues raised in the discussion included: competing priorities within countries that can undermine the contribution of science to critical challenges such

as disaster risk reduction, and the need to build linkages with social entrepreneurs to translate academic research into viable market solutions.

Combating Lead: From Paint to Batteries, how new policies and technologies are helping tackle a dangerous toxicant: This session took place on Saturday morning and was facilitated by UNEP’s Law Division. The panel comprised: Jacqueline Alvarez, UNEP; Tadesse Areme, International Persistent Organic Pollutants (POPs) Elimination Network; and Brian Wilson, International Lead Association.

Panelists provided a global overview of the lead challenge, emphasizing that “there are no safe levels” and noting the high impact on human health, with the annual global economic cost estimated at USD 977 billion in low- and middle-income countries due to lost potential to earn a livelihood. A variety of techniques and processes for the safe collection, storage, transportation, disposal and recycling of used lead acid batteries were highlighted.

Explaining that lead “tastes sweet” and its use in paint and toys is a major source of childhood lead exposure, Areme described how Ethiopia successfully developed a legislative framework after national assessments found levels of more than 100,000 parts per million (PPM) in paint, against the recommended maximum level of 90 ppm. Alvarez outlined a



L-R: **Tadesse Amera Sahilu**, Co-Chair, IPEN; **Jacqueline Alvarez**, UNEP; and **Brian Wilson**, International Lead Association

model law developed by UNEP's Global Alliance to Eliminate Lead Paint, with support from the Global Environment Facility, to accelerate the target of establishing legal frameworks in all countries by 2020.

The discussions highlighted economic opportunities from sustainable lead management, such as the production of hexagonal paving slabs in Indonesia, as well as the need to combine compliance mechanisms with consumer education and clear labeling. The need to build synergies across government sectors – such as regular monitoring of lead levels in hospitals – was also noted.

Launch of GRO 2019: Implications for business leaders:

This session on Saturday afternoon was coordinated by the IRP. Izabella Teixeira, Co-Chair, IRP, underscored the focus on engaging key stakeholder communities, noting that, along with a summary for policy makers, this edition features the first-ever summary targeted specifically at business leaders.

Janez Potočnik, Co-Chair, IRP, explained that the analysis paid particular attention to drivers and impacts of resource depletion, with assessments of current levels and future projections of global stocks of biomass, fossil fuels, metallic and non-metallic minerals, land and water. Posing the question, “Why does this matter for business?” Potočnik noted that understanding materials can help save on costs and build resilience to increase resources, create new customer value and unlock new growth.

Bruno Oberle, Lead Author, GRO 2019, said that overall global trends show accelerated resource use in recent decades. He explained that the Report provides insights and recommendations for sustainable management of each material, as well as a selection of case studies and best practices to achieve “decoupled markets.”

Concluding, Potočnik emphasized that “it is time to fix the broken economic system,” remarking that “humans are supposed to be intelligent – it’s time to prove it.”

Business perspective: Building on the introductory session, this panel explored some strategic insights for the business community. The panel comprised: Stefanie Hellweg, Swiss Federal Institute of Technology (ETH); Matteo Cavadini, Enel East Africa; Agus Justianto, Government of Indonesia; and Harry Verhaar, Signify.

Underscoring that fast transitions are possible, panelists explained how a focus on efficiency and circular thinking contributes to innovation, both in product design and services. They emphasized that policy is a key part of the solution, highlighting examples of how governments can use performance-based public procurement to incentivize sustainable business practices, as well as the role of standards and regulations in promoting “future proof” modular product design across industry sectors.

Other issues highlighted in the discussions included the potential to address urban transportation challenges by enabling electric cars both to charge and to discharge power onto the electricity grid. Noting that such solutions require close collaboration between the science, policy and business communities, one speaker urged the SPBF to become more vocal to ensure that policy decisions are “evidence-based and business-enabled.”

New Hotspot Analysis Tools for Decision Making on Sustainable Consumption and Production (SCP-HAT): This session, which took place on Sunday afternoon, was hosted by IRP and included presentations by Janez Potočnik, Co-Chair, IRP; Stefanie Hellweg, ETH; Charlie Arden-Clarke, One Planet Network; and Mei-Ling Park, UNEP.

Hellweg outlined the three modules of SCP-HAT, explaining that the tool is based on UNEP's Life Cycle Impact Assessment and enhances application of the GRO by enabling more targeted analysis and monitoring of specific countries and sectors, and that the tool allows integration with national databases to enable more detailed analysis. Park emphasized its value in developing compelling stories and messages about change on the ground and invited delegates to attend demonstrations of the tool during UNEA-4.

Driving Transformative Innovation through Sustainable Chemistry: This session on Sunday afternoon was organized by the International Sustainable Chemistry Collaborative Centre (ISC3); and moderated by Agnes Dittmar, Director Policy & Communication, ISC3. Panelists included: Achim Halpaap, Head, Chemicals and Waste Division, UNEP; Nzambi Matee, Founder, Gjenge Makers, Kenya; Yann Schemm, Director, Elsevier Foundation; and Sascha Gabizon, Executive Director, Women Engage for a Common Future.



L-R: **Achim Halpaap**, Head, Chemicals and Waste Division, UNEP; **Yann Schemm**, Director, Elsevier Foundation; **Agnes Dittmar**, Director Policy & Communication, ISC3; **Nzambi Matee**, Founder, Gjenge Makers; and **Sascha Gabizon**, Executive Director, Women Engage for Common Future

Discussions explored supporting innovations so that chemicals can contribute to sustainable consumption and production in circular, climate-resilient societies through: fostering innovation; changing the mindset of chemists; and promoting international dialogue and political frameworks. One panelist summarized the Global Chemicals Outlook, to be launched on 11 March 2019, highlighting insights to help achieve the SDGs through replacing some legacy chemicals and avoiding mistakes made in the past.

One panelist shared her company's vision to use plastic pollution to address the challenge in housing, while participants called for life cycle analysis to avoid the hazards of recycling products containing harmful chemicals.

Emerging Issues: Solving the Broken Nitrogen Cycle:

This session on Sunday afternoon was chaired by Christopher Cox, UNEP. The panelists included: Ramesh Rama Chandaran, Ministry of Environment, India; Mark Sutton, Centre for Ecology and Hydrology; and James Mutegi, International Plant Nutrition Institute.

On the broken nitrogen cycle, panelists highlighted the issue of too many nutrients going into the environment or too few nutrients for maintaining healthy and productive ecosystems. On barriers to coherent action, it was stressed that nitrogen is largely forgotten in international environmental agreements because of its fragmentation within various policy spheres, such as climate change and water quality. Panelists also noted how nitrogen can be used sustainably to enhance food production and lower environmental impact, through, for example, decision support tools such as assistance of nutrient experts.

Panelists discussed a variety of recommendations, including: reframing the issue of the nitrogen cycle not as pollution but as a key component of clean air and water; and developing a nitrogen coordination mechanism linking UN conventions. It was noted that there is a proposal for a UNEA-4 resolution on sustainable nitrogen management to facilitate global coordinated action.

Sustainability Research and Innovation 2020 (SRI2020):

This session on Sunday morning was co-organized by the Belmont Forum and Future Earth, and facilitated by Makiba Charles-Ayinde, AAAS. Introducing the objectives of the Initiative, Josh Tewksbury, Future Earth, said that while sustainability science is growing at twice the rate of science in



Erica Key, Belmont Forum

general, researchers within this space “need more light and bigger tents” in order to grow and interact more effectively.

Erica Key, Belmont Forum, said SRI2020 aims to kickstart this process by launching an annual platform where a community of academics in natural sciences, humanities and social science, as well as other stakeholders, can come together to, *inter alia*, develop the metrics for transdisciplinary research and plan joint actions.

Welcoming the proposed platform, participants highlighted the need to: involve other scientific communities such as inter-academy partnerships, government scientists and citizen science communities. Expressing concern about how the SDGs are being transformed into a “myth,” one speaker noted the role of the proposed platform in developing rigorous indicators, while another suggested that it could help bring the many existing assessments together to reduce duplication of efforts. Supporting this proposal, another speaker emphasized that to gain the attention of policy makers, the scientific community needs to develop compelling and unified messaging.

Noting that several institutions have expressed interest in hosting SRI2020, Charles-Ayinde concluded by issuing a call for contributions to the platform and reported that more information would be made available on the website, Sri2020.org, in the coming month.

Citizen Science for Smart and Sustainable Cities of the Future: This session on Sunday afternoon was organized by the Citizen Science Global Partnership and Woodrow Wilson International Centre, and moderated by Martin Brocklehurst, European Commission, and Anne Bowser, Citizen Science Global Partnership. The panel consisted of: Astrid Schomaker, Director for Strategy, European Commission Directorate-General for the Environment; Jean Dusart, European Commission; Timothy Nixon, Managing Editor, Thomson Reuters; and Kathleen Rogers, President, Earth Day Network.

Panelists described citizen science as a way to empower citizens to connect science and policy, and mobilize actions to meet the SDGs by collecting, analyzing and sharing data. Citing examples of how citizen science has influenced policy change, one panelist challenged citizen science to apply methodologies



Facilitator Makiba Charles-Ayinde, AAAS

to help promote transparency among large emitting corporations that have a pattern of non-disclosure.

Discussions touched on improving environmental literacy through citizen science and highlighted an initiative of the Earth Day Network to create the largest open source database in the world, populated by citizen science. All speakers reiterated how the citizen science movement mobilizes and empowers action for accelerated change.

Third Pole: A Call for Action to Combat Climate Impacts in Fragile Ecosystems:

This session took place on Sunday afternoon and brought together researchers focusing on the Pan-Third Pole and other mountain regions. Facilitated by Nicholas Middleton, UNEP, the panel comprised: Tandong Yao, Institute of Tibetan Plateau Research, Chinese Academy of Sciences; Xi Chen, Chinese Academy of Sciences; Alejandro Argumedo, Director, Association ANDES; Dagfinnur Sveinbjornsson, CEO, Arctic Circle; and Jan Dusik, UNEP.

Panelists noted the sensitivity of the Third Pole – commonly referred to as the Asian Water Towers – to global warming, noting the need for integrated policy making, as was the case with the Arctic Circle. Explaining that the different poles are intrinsically connected, they highlighted the importance of research collaboration in the recent Hindu Kush Himalaya Assessment, which was modeled on the Arctic assessment. Case studies from the Himalayas and Andes were used to highlight how biocultural innovations linked to low carbon agriculture can contribute to biodiversity conservation, food security and climate resilience in mountainous regions.

Dusik reported on the forthcoming launch of the UNEP-GRID Arendal report, “Global Linkages – A Look at the Arctic,” as a tool for visualizing key climate and environmental issues in mountain regions. Former Russian ice hockey champion Slava Fetisov presented his global initiative, #TheLastGame and explained that it brings together athletes, scientists and policy makers to raise awareness on climate change.

Thematic Stream 2: Big Data: Towards a Digital Platform for Our Planet

Big Data, New Frontiers: Part 1: This introductory session took place on Saturday morning. Alexandre Caldas, UNEP, welcomed participants, noting that all big data starts with small bits of data. He said one of the challenges to be addressed in the discussions is the difficulty in integrating multiple streams and varieties of data.

Pascal Peduzzi, Director, UNEP Global Resource Information Database (UNEP-GRID), called for solving environmental problems, not just measuring them. He said this requires

processing data, turning it into information to support decisions, and then on-the-ground implementation.

Pierre Lacroix, UNEP-GRID Africa, outlined problems with big data, including: fragmentation; proprietary formats for some data; heterogeneity and incompleteness; redundancies; siloing; and issues of interpretation and analysis. He noted that issues change rapidly and data needs regular updating.

Adam Smith, Co-founder, Descartes Labs, described Descartes’ objective to “clean up” and adjust raw data by bringing different forms of data together so it can be analyzed for different uses and applications.

Stuart Minchin, Geoscience Australia, described his company’s “data cube” tool for translating raw data into useful information, the “cube” being a 3D “stack” of data on a particular location through time. He noted its operational capability to turn analysis-ready data into usable products for decision-making, on-the-ground projects and multiple stakeholders. He said it is a free and open-source platform applicable anywhere, but users must be trained, for which funding is needed.

Neil Burgess, UNEP-World Conservation Monitoring Centre (UNEP-WCMC), spoke on what satellite data means for biodiversity, natural capital and ecosystem services. He said NASA data on tree cover must be augmented with other data on tree species, distribution of other species and the biodiversity consequences of tree loss in order to measure the impact of deforestation on biodiversity, for example. He favored not just measuring nature’s decline but using big data to build models and scenarios to analyze whether biodiversity loss may be reversed.

Maurice Borgeaud, European Space Agency (ESA), described the ESA’s vision, activities and future plans. He compared ESA data to NASA’s in being free, open and available. He described some of its uses including assessing the potential for different crops, classifying land and measuring emissions from urbanization or forest burning.

During the ensuing discussion, speakers commented among other things, that: citizen science is used to ground-truth satellite data, which validates the products that satellite imagery produces, such as on water quality; strong collaboration is ongoing among



Alejandro Argumedo, Director, Association ANDES



Pascal Peduzzi, Director, UNEP-GRID



L-R: **Andrew Zolli**, Planet.com; **Cécile Thomas-Courcoux**, France; and **Jean Dusart**, European Commission

governments and organizations; and more data and calibration is needed to help identify specific actors involved in deforestation but satellite resolution is improving.

Big Data, New Frontiers – Part 2: This follow-up session on Saturday afternoon was moderated by Mark Sutton, Centre for Ecology & Hydrology.

Jean Dusart, European Commission, explained how earth observation can support the achievement of the SDGs. He discussed the largest earth observation system in the world, the Copernicus programme, clarifying that it is important to consider more than just data and apply processing and analytics to create actual solutions.

Andrew Zolli, Global Impact Initiatives, Planetlabs, illustrated how “seeing” impacts of slow moving trends, such as deforestation, can help galvanize resources. He explained how the SDGs, with 230 indicators, will require over 44,000 development projects to be designed, conceived, implemented and monitored, resulting in a complex web of interacting data points. He showed how shifting to big data will provide predictive analytics that benefit farmers, enforcement officials fighting illegal deforestation, and scientists attempting to halt coral bleaching, among others.

Cécile Thomas-Courcoux, France, outlined the objectives of the Mercator Ocean project, which is part of the Copernicus programme. She explained that it builds a digital model of the ocean, and provides assessment and builds capacity, helping to bridge science and industry. She said that data, such as salinity, surface wind and plankton, is shared through an open access system.

Participants raised questions on how to trigger action with the data collected; and how to extract indicators to build financial instruments that meet the needs of people by measuring and valuing externalities to the global economy. Zolli noted that the UN has the ability to govern how data is used.

Anne Bowser, Chair, Citizen Science Global Partnership, highlighted how citizen science can be aggregated to support national and global policy assessments, providing a voice for local communities to help drive change in sustainable development. She highlighted a project with the Earth Challenge 2020 to collect data points through citizen science that complements formal data collection. She explained that the project will produce an app and provide a software development kit to identify concrete actions the public can take.

Laurent Durieux, Institute of Research for Development (IRD), shared efforts to connect the impact of climate change to local impacts, aimed at empowering stakeholders to consider how to react to future and inevitable impacts. He shared work to improve multi-source data access and climate models, produce products and services to share information, and further develop international cooperation.

Participants asked questions about: down-scaling messages from data in order to bridge science and inform decision making; restoring hope in a sustainable transition and promoting systematic approaches; and improving the perception of quality of citizen data.

A panel on – What’s for Free and What is Not, brought together James Donovan, CEO, ADEC Innovations; Rhian-Mari Thomas, Global Head, Green Banking, Barclays; and Andrew Zolli, Planetlabs.

Donovan explored how data solutions can help bridge private capital to support development challenges by balancing government’s long-term vision with the short-term solutions from industry. Thomas shared an example of a bank using data that correlated users of energy efficiencies to lower rates defaulting on mortgages as a way to create changes in policy and lower rates for lending.



L-R: **Charles Sebukeera**, UNEP; **Maria Andrzejewska**, Director, UNEP/GRID-Warsaw Centre; **Derek Gliddon**, Acting Director, Abu Dhabi Global Environmental Data Initiative; **Margaret Nthuli**, ESRI, East Africa; and **Thea Carroll**, CITES MIKE Secretariat

In the ensuing discussion, participants raised questions on how to access data from private sources to support measurements relevant for the SDGs, among other things.

Foresight, Early Warning for Decision-Making: This panel discussion took place on Sunday morning and included: Abdu Muwonge, World Bank; Thea Carroll, Programme on Monitoring the Illegal Killing of Elephants (MIKE) of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); Charles Sebukeera, UNEP; Margaret Nthuli, Environmental Systems Research Institute (ESRI); and Derek Gliddon, Abu Dhabi Environmental Agency. It was moderated by Alexandre Caldas, UNEP.

The discussion focused on “foresight” as a scientifically validated early warning system combining different methodologies and techniques, increasing the impact of foresight data, and condensing data to get important information in front of the right people concisely and powerfully.

Other topics included: citizen science data collection projects; use of geographical information systems (GIS) for data collection and analysis for informed decision-making; ground-truthing of remote sensing data; the Abu Dhabi Global Environmental Data Initiative; quality data streams on the state of the environment, and its drivers, to produce actionable information; using indicators to frame reporting to make data useful from the local to the global contexts; addressing the challenges of data silos and limited resources; and template and algorithm-based workflow automation in the Indicator Reporting Information System as a data-sharing mechanism.

MIKE was described as an example of using an early warning system to monitor trends and establish an information base to inform management of elephant populations. Another example given was using GRID foresight data to visualize and monitor consumption and production in cities, such as by mapping urban waste and optimizing communication.

Innovative Technologies and Approaches in Monitoring the SDGs: Moderated by Mark Sutton, Centre for Ecology and Hydrology, this session on Sunday afternoon included a panel

discussion with: Gilberto Câmara, UNEP; Brian Sullivan, Google Earth Outreach; Philip Thigo, Kenya; Jillian Campbell, UNEP; and Steffen Fritz, International Institute for Applied Systems Analysis (IIASA).

Panelists noted difficulties in monitoring and poor quality of data for many SDG indicators, stating that 68% of indicators have insufficient data to assess progress. They described useful tools such as: a free and open geo-spatial time machine that extracts virtual historical data and helps in, for example, producing information on whether freshwater supply is decreasing or increasing; and Google Earth, another open tool that combines several images taken over a short time so that the area appears with no cloud cover - this process can then be repeated regularly to show change.

One panelist said the SDGs are being “held hostage” by data sensing groups - with another lamenting that the Food and Agriculture Organization of the UN’s Forest Resource Assessment data is closed. Several panelists favored co-designed and co-produced tools so that results can be trusted and to ensure that data is replicable.

The Africa Regional Data Cube was described as a co-designed, co-created data-driven solution to “make rocket science into everyday science.” A prototype tool that can evaluate different indicators, including social and economic data, was described. It was also noted that: SDG indicators say nothing about when, where or why something is happening; while assessments show that policy targets are mostly on track, consumption and fossil fuel use are increasing and the state of the environment is declining; and geospatial, disaggregated data is critically needed.

Monitoring Ambient Water and Air Quality and Launch of GEMStat Data Interface: This session took place on Sunday afternoon. Panelists included Philipp Saile, GEMS Data Centre, Germany; Dylan Blake, UMVOTO Africa; Nathan Pavlovic, Sonoma Technology; Miguel Escribano, Kunak Technologies; Steffen Fritz, IIASA; and Stephanie Holzwarth, UN Habitat. The moderators were Hartwig Kremer and Sean Khan, UNEP.



L-R: Hartwig Kremer, UNEP; Dylan Blake, UMVOTO Africa; Philip Saile, GEMS Data Centre, Germany; Steffen Fritz, IIASA; Stephanie Holzwarth, UN-Habitat; Sean Khan, UNEP; Nathan Pavlovic, Sonoma Technology; and Miguel Escribano, Kunak Technologies

Panelists discussed the GEMStat global water quality database which allows users to visualize and analyze data at three spatial scales for non-commercial use. A case study was presented on monitoring major aquifers in the Cape Town region after its severe 2018 water shortage partially caused by contamination from unrestricted urban sprawl, industry and salination. Attention was drawn to the need for critical citizen-scientists and investigators to fact-check “fake news” and for behavioral and social changes, which are not keeping up pace with technological innovation but which can influence policy.

A pilot global framework for providing satellite measurements to quantify air pollution was then described. A pilot study to build new infrastructure for air quality monitoring was also presented. One participant called for globally agreed methodologies for citizen scientist measurements and for their feedback on the health consequences of air quality problems. A case study was presented on monitoring air quality before and after policies to lessen traffic in two Kenyan localities, which found that pollution halved with street closure.

Special Session on Fast-Tracking the SDGs Using Frontier Technologies: This IBM-hosted session took place on Saturday afternoon and included a demo on using earth observations and big data. Introducing the session, Hendrik Hamann, IBM Research, explored the challenge of being able to query planetary data collected, explaining that “information without context is hardly actionable.”

Bruno da Costa Flach, IBM Research, demonstrated how technologies such as artificial intelligence, drones and cloud storage, can improve agricultural processes by leveraging data points on soil composition, nutrient profiles and weather to provide insights on yield for farmers in a timely way and improve accuracy for banking institutions.

Jehiel Oliver, CEO, Hello Tractor, Nigeria, outlined the positive social impact of providing technology to deliver affordable tractor services and affordable soil testing to farmers,

while creating an open and transparent collection of data that can help to de-risk investments.

Ajay Deshpande, IBM Research, explained how linking information through blockchain technology enables trust through transparency and traceability, asserting that the technology could decrease food waste by 40%, improve freshness and inspire solutions by linking concurrent shortages and surplus.

In ensuing discussion, participants discussed the accessibility of planetary data, questioning its accessibility to less developed economies.

Thematic Stream 3: Smarter, Greener Solutions for Cities

Innovation in the Energy Sector and the Future of Sustainability: This session on Saturday afternoon was hosted by Signify and moderated by Harry Verhaar, Signify. Panelists included: UNEA-4 President Siim Kiisler; Paul De Larminat, Johnson Controls; Kristina Klimovich, GNE Finance; and Jonathan Everhart, CEO, ReEnergy Holdings.

Discussing some challenges and opportunities for increased innovation in the energy sector, panelists highlighted: opportunities for EU countries committed to energy and resource efficiency to benefit from energy efficiency; barriers to new energy efficient technologies such as investment hurdles, lack of adequate ambition levels, quality standards, and the need for trained labor to implement good solutions; innovative finance solutions for energy-efficient home renovations; and use of green bonds to finance energy efficiency projects.

Towards Global Green Energy Transition: Empowering Policies and Innovative Finance: This session took place on Saturday afternoon. Huang Han, GEIDCO, explained his company’s plans to develop and roll out a global clean-energy smart grid to meet energy demand.

Marta Juarez, Costa Rican ambassador to Kenya, described her country’s achievement of 99% energy decarbonization, demonstrating that deep ambitions can be achieved. She said



Marta Juarez, Costa Rican ambassador to Kenya

80% of Costa Rica's energy comes from hydropower, with much smaller proportions coming from wind, biomass and solar.

Anselmo Leal, State Grid Brazil Holding, described a small-scale test of GEIDCO's smart-grid model in Brazil, noting that the concept was found to be feasible, but highlighted distribution challenges in reaching small and geographically remote communities, which requires strong policy intervention to attract investors.

Luming Ai, Chair, SEE, stated that his organization was established in response to huge sandstorms, to address desertification in Mongolia. He said SEE's members promote environmental disclosure through NGO environmental assessment and monitoring, green supply chains and green standards and criteria.

In ensuing questions, speakers commented that decentralized small-scale clean energy production cannot cover all energy demand but can be a part of the solution in cities and can link to the big grid. In answer to a question from a young environmental

hero in Kenya, Ai said SEE encourages children to join the effort to protect nature.

Liu Zhenya, Chair, GEIDCO, closed the session, recalling that GEIDCO was created to meet energy and environmental protection needs. He said the company will implement the Paris Agreement and be measurable, accountable and clear.

Accelerating Africa's Shift to Electric Mobility: This session took place on Saturday afternoon and was chaired by Rob de Jong, Head of Mobility Unit, UNEP.

Panelists included: Peter Kaigwara, Energy Regulatory Committee, Kenya; Jane Akumu, Programme Officer, Mobility Unit, UNEP; Michael Walsh, Independent Expert, International Council on Clean Transportation; and Steve Chang, General Manager, South Africa Office, BYD Auto Company Ltd.

Panelists addressed a number of issues related to Africa's shift to electric mobility, such as: raising public awareness of the opportunities for electric vehicles; ensuring reliable energy supply and affordable pricing; addressing the issue of importing used diesel vehicles into Africa; securing local supply chain and policy incentives for electric vehicles; and creating opportunities for "leapfrogging" towards electric mobility through integrated policy making and compact, mixed-use city planning.

Attaining Clean, Affordable Energy in Africa: The Role of South-South Cooperation: This session on Saturday morning included a panel discussion with: Huang Han, GEIDCO; Isaiah Owunji, WWF; Mohua Mukherjee, International Solar Alliance; and Vincent Kitio, UN-HABITAT.

Noting that despite its rich potential, Africa's share of renewables in the global energy mix stands at only 20%, the panel explored strategies for accelerating the energy transition on the continent through, *inter alia*, better integration of technologies, infrastructure and performance data. Remarking that "we need trained feet on the streets, not bottoms on the seats at international conferences," Mukherjee called for better



L-R: **Rob de Jong**, Head of Mobility Unit, UNEP; **Steve Chang**, General Manager, South Africa Office, BYD Auto Company Ltd; **Jane Akumu**, Programme Officer, Mobility Unit, UNEP; **Michael Walsh**, Independent Expert, International Council on Clean Transportation; and **Peter Kaigwara**, Energy Regulatory Committee, Kenya

awareness and management of risk through: producing more specific data on technology performance; channeling credit through energy distributors; and exploring blended capital instruments to de-risk investments.

The panel highlighted the role of South-South Cooperation in sharing experiences, providing a platform to scale up proven business models, and facilitating capacity building. They shared an example of a project in which African women were trained in India as “barefoot solar technicians.” At the policy level, the Covenant of Mayors on Energy and Climate Change, and India’s Priority Sector Lending initiative were highlighted as examples of supply-driven frameworks for promoting sustainable energy initiatives.

The discussions also highlighted some challenges, such as the high cost of off-grid solutions for poor and dispersed rural communities and the need to increase access to best available technologies for investors as well as consumers.

Environmental and Health Impacts - Messages from GEO-6: Waste systems: This session took place on Saturday morning and was moderated by Matthew Billot, UNEP.

Billot introduced the Global Waste Management Outlook, noting the need to bring waste under control and to harness the potential of waste as a resource. Martin Brocklehurst, Citizen Science Global Partnership, highlighted the need to think about materials management rather than waste management in order to remove roadblocks to recovery and reuse of materials.

Serge Salat, President, Urban Morphology and Complex Systems Institute, illustrated opportunities for integrated urban infrastructure planning, particularly at the neighborhood level.

Sustainable Water and Waste Management in Developing Cities: This session on Sunday morning was co-chaired by Hartwig Kremer, UNEP, and Veerle Vandeweerd, Global Science Technology and Innovation Conference.

The panelists included: Min Yang, Deputy Director, Research Centre for Eco-Environmental Sciences (RCEES); Thierry De Oliveira, Economist, Science Division, UNEP; Nahashon Muguna, Managing Director, Nairobi City Water and Sewerage Company; Tom Ogada, Executive Director, African Centre for



Veerle Vandeweerd, Global Science Technology and Innovation Conference

Technology Studies; and Maksudur Rahman, Regional Manager – East Africa, Ion Exchange (India) Ltd.

Clarifying that waste water is not waste but a resource, panelists discussed, *inter alia*, the need to scale up investment and define waste water as an asset class, the importance of changing the perception that it is waste, and the need to change public service culture in the water sector.

Participants also highlighted a number of examples such as: China’s efforts to improve water quality through increased environmental monitoring and construction of municipal waste water treatment plants; Nairobi’s waste water’s potential as a resource being hindered by lack of funding and public private partnerships; and policy incentives in Kenya for producing biogas from waste water.

Development of Sustainable Water Infrastructure: This session on Sunday morning was moderated by Hartwig Kremer, Head, Global Environment Monitoring System for Freshwater, UNEP.

The panel comprised: Polite Laboyrie, President, Central Dredging Association; Arjan Hijdra, Director, Global



L-R: Geert van Cappellen, Secretary-General, World Association for Waterborne Transport Infrastructure; Arjan Hijdra, Director, Global Infrastructure Institute; Remment Ter Hofstede, Van Oord Dredging and Marine Contractors; and Polite Laboyrie, President, Central Dredging Association

Infrastructure Institute; Remment ter Hofstede, Van Oord Dredging and Marine Contractors; and Geert van Cappellen, Secretary-General, World Association for Waterborne Transport Infrastructure.

Panelists exchanged views on how to move beyond traditional paradigms to transform water-borne infrastructure. One panelist outlined sustainable design principles, including: using nature-based solutions; applying resource efficiency; designing circular supply chains; adding project value; adjusting for flexible design; and engaging stakeholders. Others identified the gap between existing nature-based solutions and “green funding,” proposing to optimize the value proposition by merging the two.

Panelists shared examples of sustainable designs, noting the need to consider ecosystems individually and generate co-benefits to overcome political and societal perceptions.

Alternatives to Plastics: Current Challenges and Future Vision: This session on Sunday morning was moderated by Brennan Van Dyke, UNEP. Panelists included: Geoffrey Wahungu, Director-General, National Environment Management Authority, Kenya; Lilian Magak, Kenya Commercial Forestry Programme; Yoshiki Takeoka, Kaneka Corporation; Shollay Ramlaul, BASF East Africa; and Albert Nyagechi, Kenya Bureau of Standards.

Panelists acknowledged that although plastics have been a useful material, they have become a severe threat to the environment and human health, noting the lack of viable alternatives and loss of jobs as challenges. One panelist shared the Kenyan experience in banning single-plastic bags, illustrating how strong political signals stimulated production of alternatives and underscored the value of partnerships. Reporting that 90% of waste produced in Kenya is organic and ends in landfills, a panelist detailed efforts to produce biodegradable alternatives that add value by creating composting conditions, leading to the establishment of an infrastructure for quality standards to test claims.

Thematic Stream 4: Climate Challenge: Finance, Markets and Non-State Actors

The Climate Challenge and Non-State Actors:

Understanding the challenge: This extended session on Saturday afternoon was hosted by Thomson Reuters. Moderator Timothy Nixon, Thomson Reuters, opened this introductory segment, commenting that “you cannot measure what you cannot see.” He noted that the top 250 publicly traded companies produce one-third of annual anthropogenic emissions and noted that decarbonization helps companies increase their returns.

Xie Zhenhua, China, described his country’s progress in policy making and innovation to reach climate targets, noting that some have been reached early, including afforestation and carbon sinks targets. He attributed these outcomes to the government’s vision and wide participation within Chinese society.

Maurice Borgeaud, ESA, shared efforts to pool all data available to better understand what is happening to the planet. He gave examples of information produced through its Climate Change Initiative on variations in sea level rise due to thermal expansion, Arctic melting, Antarctic glacier breakup, CO₂ emissions and methane from wetlands in Nigeria.

Anne Bowser, suggested that citizen scientists help solve the climate science problem by collecting data, measuring methane emissions, and photographing point source emitters and sharing this information, but acknowledged that engaging the public in research raises ethical questions.

Carlo Papa, Enel Foundation, said companies benefit from disclosure, but the stock market is not equipped to understand climate change risks and prioritize correctly; the public must therefore determine companies’ real value themselves and direct their investments toward climate “heroes.”

During a question-and-answer session, speakers commented that: everyone has an interest in measurable data but leveraging private sector-held data for the public good is a critical challenge; there are too few regulatory targets, except in China;



L-R: **Geoffrey Wahungu**, Director General, National Environmental Management Authority, Kenya; **Lilian Magak**, Kenyan Commercial Forestry Programme; **Yoshiki Takeoka**, Kaneka Corporation; **Shollay Ramlaul**, BASF East Africa; and **Albert Nyagechi**, Kenya Bureau of Standards



L-R: **Gayle Schueller**, 3M; **Rhian-Mari Thomas**, Barclays Green Banking Council; and **Jian Liu**, Chief Scientist, UNEP

environmental issues are interconnected so solutions must be holistic and based on sustainable development; and developing countries can benefit from increased South-South cooperation.

Part 2: The Way Forward: Opening the discussion, Jian Liu, Chief Scientist, UNEP noted that leaders in business have leapfrogged over policy-making and begun to act. He said climate action requires partnerships between the science, policy and business sectors but non-state leaders can show the way forward.

Paul Jefferiss, BP, asked how non-state actors can show leadership in the face of massive uncertainty and risk. He noted the dual challenges to lower emissions rapidly but also meet growing energy demands, particularly in poorer regions. He advocated: advancing cautiously while maintaining flexibility to evolve rapidly as transition progresses; reducing emissions and improving products to enable customers to also reduce emissions; and creating low-carbon business. He said BP lost money with big investments in renewable energy in 2004 and advocated small but wide arrays of venture investments that can scale up. He noted that discussions about sustainability are mainstream now.

Gayle Schueller, 3M, described their sustainability framework to do more with less material and innovate to decarbonize the

industry. She noted that every new product will now have to have a sustainability value commitment rating regarding its impact on the greater good and that 3M’s headquarters uses 100% renewable-based power.

Rhian-Mari Thomas, Barclays, said the financial sector creates scenarios for assessing risk but that historical data is not helpful in this era of disruption and huge risk. She said that as more data and expertise develop, capital will be increasingly mobilized toward products that meet environmental, social and governance criteria. She noted banks’ huge convening power to bring all parties together to further the discussion.

During questions, speakers supported the need for urgent transformation but cautioned against putting capital at risk, calling for a carbon tax and partnerships with customers, policymakers and regulators.

The Power of Integrated Action on Air Pollution: Stories from China and Africa - South-South Cooperation: This session on Saturday afternoon was moderated by Naysán Sahba, UNEP. Panelists included: Gyimah Mohammed, Ministry of Environment, Science, Technology and Science, Ghana; Bala Bappa, Federal Ministry of Environment, Nigeria; Ruth Sego, Programme Associate, ClimateWorks Foundation; Yu Jianhua, Deputy Director General, Beijing Municipal Bureau of Ecology and Environment; and Stephen Kukoda, Executive Director, International Copper Association.

Panelists discussed a number of issues related to the integration of air pollution and climate action, including the need for: national action plans to reduce short-lived climate pollutants as part of the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC); decarbonization of the global maritime sector; subsidies to incentivize the substitution of air-source heat pumps for coal-fired boilers in China; and strong government action on the structural adjustment of industry, mitigation measures, and emission standards in heavily polluted cities.



L-R: **Jianhua Yu**, China; **Gyimah Mohammed**, Ghana; **Bala Abubakar Bappa**, CCAC; **Ruth Sego**, ClimateWorks Foundation; **Steven Kukoda**, International Copper Association; and **Naysán Sahba**, UNEP



L-R: **Naysán Sahba**, UNEP; **Pavel Kabat**, Chief Scientist, World Meteorological Organisation; **Helena Molin Valdés**, Head, CCAC Secretariat; **Rodolfo Lacy**, OECD; and **Johan Kuylenstierna**, SEI

Putting the World on a Safe Path to Meet the 1.5°C

Challenge: This session, coordinated by the CCAC, took place on Saturday afternoon and was moderated by Naysán Sahba, UNEP.

The panelists included: Johan Kuylenstierna, Policy Director, Stockholm Environment Institute (SEI); Pavel Kabat, Chief Scientist, WMO; Helena Molin Valdés, Head of Secretariat, CCAC; and Rodolfo Lacy, Director, Environment Directorate, OECD.

Participants highlighted, among other issues: the need to transfer scientific knowledge to decision makers in a coherent way; the importance of synergies between energy, mitigation, air quality and health approaches in order to inform integrated emission pathways; the risk of fragmented policy-making; strengthening institutional capacity at the national level; the imperative of massive investment in low carbon and climate resilient infrastructure; and opportunities to use data analytics to bring together different scales of analysis on climate change, to shorten the distance from the centuries' time scale to the time scales of investors and policy makers.

Green Collar Jobs, A Bright Hope for the Planet: This session on Sunday morning was moderated by Timothy Nixon, Thomson Reuters. Panelists were: Bert de Wel, International Trade Union Confederation; Charlotte Bonner, National Union of Students, UK; Susan Gardner, Deputy Director, Ecosystems Division, UNEP; Jiang Wu, Tongji University, China; and Carlo Papa, Director, Enel Foundation.

Panelists shared a sense of urgency in discussion of green job opportunities, highlighting the need to weave the thread of sustainability throughout the entire education system in order to shift all jobs to be green. Connecting talent coming into the pipeline and jobs available in the workplace was identified as a key challenge, with one panelist proposing the solution of engaging students with the green workforce while they are in school.

Discussions explored how to ensure that the green transition is just and fair while simultaneously delivering the profound changes in society required for sustainable development.

Avoiding Global Warming through Clean and Efficient Cooling Innovations:

Lily Riahi, Global Lead, District Energy in Cities, UNEP, moderated the session on Sunday morning.

The speakers included: Nihar Shah, Deputy Leader of the International Energy Studies Group, Lawrence Berkeley National Laboratory; Edouard Heripret, General Manager East Africa, Schneider Electric; Mohua Mukherjee, International Solar Alliance; Jonas Loholm Hamann, Danfoss; and Nick Novelli, Yale University.

On drivers of clean and efficient cooling innovations, participants discussed a number of examples, such as: the entry into force on 1 January 2019 of the Kigali Amendment to the Montreal Protocol; global implementation of minimum energy performance standards; integrated approaches for cooling at multiple scales; disruptive business and financing models; and conducive policy environments.

A variety of lessons and recommendations were discussed, such as: the India Cooling Action Plan, which aims to provide an integrated approach to cooling in order to reduce emissions; the need to make cooling inclusive and multi-ministerial to provide coordination across stakeholders; the use of integrated approaches to cool data centers; and combining heating and cooling with renewable energy sources in supermarkets.



Carlo Papa, Director, Enel Foundation



L-R: **Axel Threlfall**, Editor-at-Large, Reuters; **Steven Kukoda**, International Copper Association; **Paolo Falcioni**, APPLIA Home Appliance Europe; **Carlo Papa**, Enel Foundation; **Akiko Seyoum Ambaye**, CEO, Orchid Business Group; and **Janez Potočnik**, Co-Chair, International Resource Panel

The Race to a Clean Energy Future: This session took place on Sunday morning and was moderated by Axel Threlfall. The panelists included: Janez Potočnik, Co-Chair, IRP; Steven Kukoda, Executive Director, International Copper Association; Paolo Falcioni, Director-General, APPLIA; Akiko Seyoum Ambaye, CEO, Orchid Business Group; and Carlo Papa, Director, Enel Foundation.

Among issues raised by the panel were: opportunities to decouple resource use from economic growth; how the United for Efficiency (U4E) project is supporting developing countries and emerging economies to transition to high-efficiency products; the role of transparency and energy labels in driving energy efficiency; and aligning policies and institutions to support clean energy.

Highlighting recommendations for follow-up action, panelists noted the need to: implement minimum energy performance standards in countries around the world; scale up finance for energy efficiency measures; change the mindset that renewable energy needs to be small scale; make energy efficiency part of every country's climate strategy; and ensure policy models are adapted to local contexts.

Towards Integrated Action on Air Pollution and Climate Change: This session took place on Sunday afternoon and was chaired by Timothy Nixon. The speakers included: Nobuyuki Konuma, Deputy Director, Ministry of the Environment, Japan; Dechen Tsering, UNEP; Arnico Kumar Panday, International Centre for Integrated Mountain Development (ICIMOD); and Alice Kaudia, CCAC.

The panelists highlighted a number of issues, including: the critical link between climate and health benefits; the importance of co-benefits for climate change mitigation and air pollution control; the need for coordinated policy action to address urban air pollution; the opportunity for the private sector to deliver

dual benefits; and the challenge of new coal-fired power plants in Southeast Asia.

Speakers presented findings from two new integrated assessments, including the report, "Air Pollution in Asia and the Pacific: Science-Based Solutions," that outlines 25 cost-effective clean air policy measures, and the Hindu Kush Himalaya Assessment, which highlights the need for more cooperation and collaboration to address air pollution and water risk in the region.

Plans for a new African integrated assessment were also presented. The assessment aims to explore the links between air pollution, climate change, human health, and natural resource production systems in order to inform effective and efficient policies and practices.

Thematic Stream 5: Sustainable Food for a Healthy Planet

Making Trade a Positive Force in the World: This session on Saturday morning was hosted by UNEP-WCMC and co-facilitated by Tim Christophersen, UNEP, and Izabella Teixeira, Co-chair, IRP. The panel comprised: Hermine Kleymann, WWF International; Sileshi Getahun Hailu, International Network for Bamboo and Rattan Governance; and Helen Crowley, Kering. Discussions addressed how trade flows between countries influence national use of natural resources and biodiversity.

Exploring challenges, Teixeira underscored that 90% of biodiversity loss is related to natural resource use, raising the importance of decoupling economic growth and natural resource use to minimize environmental impacts. Kleymann identified a gap, explaining that 80% of deforestation is caused by agricultural expansion and food production, one-third of which is traded internationally. She further noted that over 800 companies are committed to eliminating deforestation from their supply chains, but there is a lack of clear definition and guidance to support actual progress.

Hailu discussed how fast-growing bamboo, which can be grown on degraded lands, can support soil and ecosystem regeneration, while also providing a sustainable source for clothing, food, building materials and medicine. Crowley shared benefits of tracking environmental footprints across supply chains to better inform purchasing decisions.

The discussions highlighted the urgent need for transformational change, identifying the need for clear policy signals to stimulate private sector commitments and actions and the development of a new narrative with accessible and common language for both private and public sectors.

Environmental and Health Impacts – Messages from GEO-6: Food systems: This session on Saturday afternoon was facilitated by Edda Kaguthi, UNEP, and kicked off with a panel discussion with Brett Rierson, World Food Programme; Andrés Guhl, Universidad de los Andes, Colombia; and Lorenzo Giovanni, Food and Agriculture Organization of the UN.

Noting that GEO-6 addresses some fundamental questions for humanity today, including whether consumption and production patterns can be changed for a sustainable future, Giovanni stressed that it underscores that “our choices, strategies and policies matter.”

Highlighting some implications for food systems, the panel stressed the need to reduce emissions from the agriculture and livestock sector, as well as the per capita over-consumption of food in some parts of the world, as well as within countries, while meeting nutritional requirements for food-insecure groups. They further noted that food distribution, rather than price, is a more effective variable to ensure access to healthy food for all. Solutions proposed included: targeted policies to promote sustainable agriculture and food diversity, especially at the local level; combating post-harvest losses for poor communities through promoting improved hermetic storage, which has the added benefit of boosting livelihoods for women; and better disaggregation of data to enable context-appropriate policy measures.

Healthy Food for a Sustainable Planet: Part 1: The first part of this extended session took place on Saturday afternoon, moderated by Yvonne Harz-Pitre, International Fertilizer Association. Panelists included: Philip Lymbery, CEO, Compassion in World Farming; Lilian Mbuthia, Israeli Chemicals Limited (ICL); Robert Hunter, Executive Director, CropLife International; Isis Alvarez, Global Forest Coalition; and Izabella Teixeira, Co-Chair, IRP.

Panelists decried the growing trends towards industrial and monoculture agriculture and its links to biodiversity loss and land degradation, with one speaker cautioning that if this model continues, “we have 60 harvests left before we run out of food.” One panelist pointed out that enough is produced to feed 16 billion people today, noting “the biggest waste is taking food and feeding it to factory-produced livestock.” The panel highlighted initiatives to promote food and nutrition security through sustainable agriculture, including: biofortification of rice to tackle micronutrient deficiencies; promotion of agro-ecological farming approaches; and adoption of new generations of fertilizers that are less harmful to soils.

The adoption of plant biotechnology by millions of Indian farmers, and successful pesticide container management in Brazil were cited as positive examples of macro-level policies that have contributed to sustainable food systems.

Part 2: Diets to mitigate climate change: This follow-up session on Sunday afternoon was moderated by Natascha Kooiman, CEO, Smackmakers, and co-lead, Food Transition Coalition. The panel included Philip Lymbery, Compassion in World Farming; Stineke Oenema, Coordinator, UN Standing Committee on Nutrition; and Linxiu Zhang, UNEP.

Kooiman opened the discussion by suggesting that the question should not be how to feed the world, but how to nourish the world. Panelists highlighted the importance of: addressing food waste; strengthening redistribution mechanisms; focusing on local sustainable production to promote diversity and strengthen resilience; and removing incentives for inefficient commercial production.

Emphasizing that animal production is not inherently wrong, several speakers emphasized the importance of animal proteins for malnourished populations and called for a focus on balanced farming systems in which animal waste contributes to the productivity of farms.

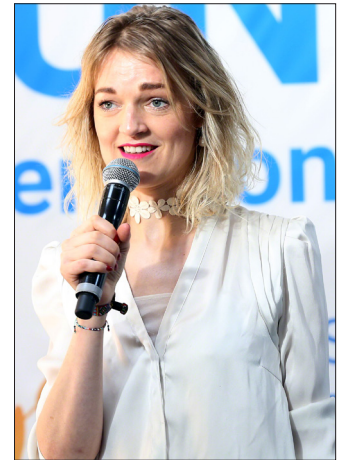
On the way forward, the panel highlighted the role of science in developing dietary guidelines that reinforce sustainability, and the need for coherent public policies to support this transition, including through greater integration of health, agriculture and trade policy.

The discussions highlighted some take-home messages, including: “peel more, unpack less”; promoting sustainable and cheap protein sources such as black soldier flies; adopting lifecycle perspectives to identify unsustainable practices across the entire production system; and promoting seasonal and locally produced food. One speaker noted that school meals offer an important entry point for crafting more coherent food policy while raising awareness on healthy eating for future consumers.

Thematic Stream 6: Green Technology Startup Initiative

The GreenTech Startup Marathon: This special session on Sunday morning was hosted by UNEA-4 President Siim Kiisler and moderated by Axel Threlfall. Threlfall explained that a number of startup companies would pitch their ventures to a panel of experts comprised of: Corli Pretorius, UNEP-WCMC; Michael Karasick, IBM Research; and Cécile Thomas-Courcoux, France.

Barry Rawlowski, Witswatersrand University, and Louis-Francois Saumon Di Nicea, FAMAE, set the context for the session, describing a business model for innovation and noting that sustainable startups should be profitable to deliver impact.



Natascha Kooiman, CEO, Smackmakers, and co-lead, Food Transition Coalition



L-R: Moderator **Axel Threlfall**, Editor-at-Large, Reuters; **Przemek Pyziel**, Founder, Planet Heroes; **Jose Manuel Moller**, Founder and CEO, Algramo; **Angelo Campus**, CEO, BoxPower; **Corli Pretorius**, Deputy Director, UN Environment World Conservation Monitoring Centre; **Michael Karasick**, Vice President, Global Labs, IBM Research; and **Cécile Thomas-Courcoux**, France

The companies then presented their business ideas, with judges providing feedback.

- Cosmo Tech, a software application to demonstrate the impact of decisions for complex systems, such as food supply and disasters;
- Planet OS, a platform to process, sort and manage big data to empower decision making;
- Algramo, an alternative plastic bag and packaging solution;
- Cove.Tool, an energy modelling startup based in the US;
- Evocco, a sustainable food app that aims to help one million consumers reduce their environmental impact;
- Triton Foodworks, which supplies high quality, pesticide free, hydroponically grown fruits and vegetables directly to consumers in India;
- FunKIDZ; a Kenyan company that creates high quality children's furniture using alternatives to timber;
- Soarability, a Chinese company that uses the Sniffer4D air quality monitoring tool to produce hyperlocal air quality information at high spatial resolution, for uses such as finding illegal emissions sources and making better air quality models;
- Planet Heroes, an environmental crowdfunding platform with 150,000 active patrons supporting 4,500 innovators; and
- Boxpower Energy, which was pitched as a solar power option with its quick turnkey installation and reliable power, combined with its financial benefits and options for batteries and microgrids.

Responding to the presentations, UNEA-4 President Siim Kiisler: praised the presenters' innovations to meet environmental challenges in production and consumption; invited UNEA parties to make investments in monitoring, security and disaster response; and called for harmonization of global environmental data.

In their feedback, judges cited scalability as the biggest challenge along with the need to articulate value to end-users in order to deliver behavior change. Noting that there are often no institutions to accommodate green startups, the panel advised the presenters to better articulate how revenue will be generated, and how their business models produce synergies with citizen science data collection approaches.

Following the judging of all entries, the judges commented that all presenters had demonstrated differentiation from other products, clarity and scalability of their business model, and impact on people's lives. They announced that many were outstanding and the top three were commended individually with no rank order: Boxpowersolar energy, Planet Heroes and Algramo.

Closing of the Forum

Closing Statements: Moderator Threlfall opened the closing session with a moment's silence for the lives lost in the Ethiopian Airlines crash that morning, which included delegates and UN staff coming to Nairobi for the opening of UNEA-4.

Shereen Zorba, Head of UN-SPBF Secretariat, thanked participants for their contributions and leadership since the first Forum and announced that the Forum will continue to make progress on the various work streams identified through to the 2020 3rd Global Session.

Threlfall thanked Wayne Balta for bringing research scientists from IBM to help attendees understand how new information technologies can be applied to environmental sustainability.

Jillian Campbell said big data is needed for assessing progress on the SDGs, making better decisions and investments, and empowering communities. Noting data gaps, she called for turning data into actionable information.



Shereen Zorba, Head of UN-SPBF Secretariat

Andrew Zolli said the SDGs are part of the world's moral agenda, and that artificial intelligence and big data are integral components of this. He noted that the current technological revolution is producing more and better data and analytical tools. He said planetary data shows the whole picture but also the finest grains of data and facilitates understanding of feedback cycles.

Laurent Durieux said the partnership on big data was now stronger and ready to develop a roadmap for this work. Louis-Francois Saumon di Nicea called for financing for green innovation and startups, noting one funder's commitment of 50% of his net assets for the environment.

Sandeep Ahuja, Co-Founder Cove.Tool said innovation must be profitable to be sustainable, and called for cooperation on big data, network connections among like-minded groups, and positive technology policies.

Wanjiru Waweru, FunKIDZ, Kenya, brought two children to the stage to show lamps made from waste materials and called upon participants to join the effort to turn waste into innovative educational products.

In closing thoughts, Satya Tripathi, UN Assistant Secretary-General, called the SPBF unique because it is focused on making people's lives better. He said inspiration should be taken from farmers in India who are taking risks to protect the planet.

Communication of Key Outcomes: On health and food, Yvonne Harz-Pitre, International Fertilizer Association, highlighted the gap between the activities of business and science and what is happening on the policy side. She stressed that governments need to apply holistic approaches to achieve healthier diets and nutrition.

On smart cities, Harry Verhaar, Signify, emphasized the need for more ambition on efficiency and mitigation, using mechanisms such as performance-based procurement, zero-carbon public building commitments, and electric fleets for public transport and government car fleets, and engagement of citizens to become part of the solution. Such initiatives would create relevant case studies for wider societal acceleration as well as increase citizen engagement.

James Donovan, Global CEO Alliance, highlighted the need to communicate and build bridges between stakeholders to establish new business models to drive the circular economy.



Mazaruni Khan and Edie Hedda Threlfall, Youth participants

Timothy Nixon, Thomson Reuters, discussed an initiative to engage the largest 250 private sector emitters in the world on climate leadership.

Mazaruni Khan and Edie Hedda Threlfall, Youth participants, called their participation in the Forum a positive experience, reflected that they feel more hopeful, and called for increased engagement with youth leaders and activists.

Izabella Teixeira, urged participants to let go of the past and step into a new vision for development that is centered on people, action, science, innovation and political will, saying that resource efficiency can push forward the solutions to mitigate the impacts of climate change.

Anne Bowser, shared a statement on behalf of the Citizen Science Global Partnership, underscoring how citizen science engages people in the delivery of quality data and helps to turn such data to information and knowledge that drives behavior changes in support of the SDGs.

Wu Jiang, Tongji University, China, highlighted the role of education in improving technologies and establishing a common global understanding of what sustainability is. Erica Key, Belmont Forum, observed convergence and coherence in messages throughout the Forum, sharing how this event has given her hope to co-create the pathways toward sustainable practices and solutions.

Jian Liu, Chief Scientist, UNEP, reflected that the Forum had transformed from "a platform to an incubator" noting the level of ambition to use data for action was high. He reminded the participants of the need for collective leadership to achieve these goals. In closing, Liu announced that India will host the next Adaptation Futures Conference 2020.

Threlfall, closed the Forum at 17:32 noting that "this is a marathon that needs to be run as a sprint."

Closed Consultations

On Friday morning, 8 March, participants attended three parallel closed consultations to reflect on challenges and opportunities, and to strategize on how to move forward the agenda around core Forum themes.

The Green Startup Initiative: This consultation explored challenges and opportunities for green startup initiatives and ways in which the Forum can help enable green innovation.

Delegates noted challenges associated with green startups, including: lack of awareness of green technologies to drive demand for them; vested interests and policies that inhibit innovation; the need for sustainable and targeted financing for SMEs; bringing innovative technologies to rural areas; the cost of energy for indoor farming; institutional blockages within government and industry such as “silo thinking”; and the need to accelerate “proof of concept” of green startup business models.

A variety of opportunities for green innovation were discussed, including: crowdfunding and blended finance for holistic approaches to innovation; declining costs of renewable energy and battery technologies; capacity building for green startups, such as green technology “boot camps”; internal mechanisms to facilitate private sector financial flows; supporting non-financial and impact metrics; increased transparency on the environmental impacts of various products; “blended storytelling” to change minds and narratives; the UN’s convening power for green innovation; and use of startups to help drive innovation through partnerships with big business.

Participants stressed the opportunity that the Forum provides for engaging states to bring together the best financing, technology and policy to enable green innovation.

Data and Earth Observations: Participants discussed issues surrounding the gathering, accessibility, and use of “big data” and considered a discussion paper on building a “global digital ecosystem for the environment” to make the multitude of big, fragmented and overlapping collections of data accessible to decision-makers and those who need to implement the SDGs and other environmental goals.

The existence of many sources of data was contrasted with the skills gap among those who need to use it. It was noted that instead of having to negotiate for years, the existence of data can spur rapid action.

Participants generally noted the complexities in understanding big data and the need for: timely, quality and disaggregated data; integration of technology in pursuing real transformation among countries at different levels of sustainable development; quick deliverables for impact on the ground in priority areas; a model for funding; and a network of national and international agencies, data centers and businesses to partner in advancing this effort.

Participants also acknowledged that the technology is changing rapidly. Alternative goals for an effort to establish a big data ecosystem were proposed, such as: building trust among decision-makers through developing strong institutions that can use emerging technologies; “following the money” by getting companies to supply important decision-making tools to governments; or getting community buy-in through inclusivity, new data sources such as citizen science and capacity building.

On Sunday afternoon, the group reconvened to discuss the way forward. It was agreed that an action plan would be developed based on the draft discussion paper discussed at SPBF-2.

The group called for the discussion paper to identify needed actionable items. Participants reiterated that big data must reduce uncertainties but questioned how to do this, especially given that UNEP and states must be carried along. They identified areas

of concern including fragmentation, complexity of big data and the need for capacity development in organizations that process data and for collaboration to turn data into policies and actions. It was agreed that the SDGs are the starting point but that building synergies to get data for multiple agreements is vital. Although UNEP is custodian only of the SDGs, one UNEP representative said that because of the UN vision for sustainable development and humanitarian action, the group must tackle all data needed for global monitoring for the SDGs and all MEAs and indeed all areas of intersection with humanitarian action. The group therefore agreed that the scope of the exercise will cover this ambitious and complex landscape and that citizen scientists and other non-state actors must be engaged.

Citizen Science: This consultation gathered the community of participants advocating and advancing citizen science in order to develop a strategy to maximize the potential for networking and building awareness around Forum themes. The group reflected on the path taken to coordinate global citizen science movements by using the UN system as a single-entry point where information can be disseminated.

Recognizing an increase in awareness, the group celebrated increased references to citizen science in GEO-6, noting the term now appears 110 times. Participants stressed the need to highlight the value of citizen science to deliver the SDGs and increase accessibility in order to maximize the number of people who can use citizen science on the global level. The group considered challenges in, *inter alia*, aggregating local information to the national and global scenarios while maintaining high standards for quality, promoting citizen science in national statistical offices, and open data systems.

The group reviewed a draft declaration prepared by the Citizen Science Global Partnership to be delivered to the Forum. They agreed to explain the value of citizen science complementing conventional science by engaging the general public, and harnessing community action to deliver data, information and behavior change. On emphasizing the importance of balancing between sufficient ambition and being realistic, participants specified some focal areas for follow up actions, such as tracking the decline of critical insects and species.

Science-Policy-Business Dialogue

On Friday afternoon, a plenary dialogue took place to outline the latest advances in science and green technology and discuss strategies to scale up impact through, *inter alia*, empowering policies, innovative partnerships, and financing. The discussions also highlighted some messages to be forwarded to UNEA, the UN General Assembly and other global processes.

Reflecting on linkages with the work of the UN Environment Assembly, UNEA-4 President Siim Kiisler, Minister of Environment, Estonia, underscored the need to bridge important conversations across the three communities. He identified important issues being addressed, such as development of environmental data harmonization frameworks and an agreement for the reduction of single use plastic products. He emphasized that the decision on plastic and marine litter is the single most important resolution for UNEA-4.



Forum participants engaged in an exchange with UNEA-4 President **Siim Kiisler**, Minister of Environment of Estonia

Responding to questions from delegates, Viisler noted how Estonia has helped organize events that enable information and communication technology startups that focus on sustainable production to build capacity and access finance, and discussed the challenge of getting countries to make concrete commitments on information disclosure during UNEA-4. On the relationship between science and the UNEA, he noted that delegations have instructions from governments on “which way they want to go”, but on emerging issues such as certain types of pollution there are no existing agreements to guide negotiations. Viisler also highlighted opportunities for citizen science and partnerships with the private sector to facilitate data collection and processing.

Representatives from business and civil society then reported on their organizations’ activities. One speaker reported her network’s work on scaling up pilot business solutions in various countries. Another described his company’s association with UNEP to develop ways to help governments integrate science into their decision-making through emerging technological tools.

Several participants previewed topics to be explored throughout the Forum, with one speaker identifying energy efficiency as a key priority, and another highlighting a platform designed to support deployment of technological solutions and sharing of best practices on multi-stakeholder collaboration to drive innovation.

On diversifying finance, participants discussed challenges in demonstrating viable business models for investors, indicating opportunities to further explore the “stories” data can tell that will deter investment in stranded assets.

Discussing policies for strengthening science, participants emphasized the importance of decarbonizing economic growth and moving into nature-based solutions in order to achieve the SDGs. Additionally, it was noted that this scenario is an important step on the pathway to equity.

Participants also underscored the importance of increased collaboration between the private sector and civil society to promote a transformative agenda, and highlighted how scientists are increasingly becoming “political players” to promote concrete solutions, as seen in the upcoming launch of GEO-6.

The session closed with messages on the power of communicating sustainability and environmental consciousness through the language of music as well as the importance of ensuring that young people and future generations are represented in the work of the Forum.

Upcoming Meetings

Financing for Development Forum 2019: The UN Economic and Social Council’s (ECOSOC) fourth Forum on Financing for Development (FfD Forum) will take place in April 2019. **dates:** 15-18 April 2019 **venue:** UN Headquarters **location:** New York City, US **contact:** Financing for Sustainable Development Office, DESA **www:** <http://www.un.org/esa/ffd/index.html>

Fourth UN Multi-Stakeholder Forum on Science, Technology and Innovation for the SDGs (STI Forum): The Fourth STI Forum will convene in New York, US, from 14-15 May 2019. **dates:** 14-15 May 2019 **venue:** UN Headquarters **location:** New York City, US **contact:** DESA **www:** <https://sustainabledevelopment.un.org/tfm>

Artificial Intelligence for Good Global Summit: Organized by the International Telecommunication Union in partnership with the XPRIZE Foundation, the Association for Computing Machinery and UN sister agencies, the Summit will provide a platform for global and inclusive dialogue to identify ways for AI to accelerate progress towards the SDGs. **dates:** 28-31 May 2019 **location:** Geneva, Geneva, Switzerland **www:** <https://aiforgood.itu.int/>

World Circular Economy Forum 2019 (WCEF2019): The third World Circular Economy Forum will convene in Helsinki, Finland. The World Circular Economy Forum is a global initiative of Finland and the Finnish Innovation Fund Sitra. The WCEF brings together business leaders, policymakers and experts to discuss how businesses can seize new opportunities and gain a competitive advantage through circular economy solutions, as well as how the circular economy contributes to achieving the SDGs. **dates:** 3-5 June 2019 **location:** Helsinki, Southern Finland, Finland **contact:** The Finnish Innovation Fund Sitra **www:** <https://www.sitra.fi/en/projects/world-circular-economy-forum-2019/>

High-level Dialogue on Financing for Development: The UN General Assembly high-level dialogue on financing for development will convene at the close of the UN High-level Political Forum on Sustainable Development. **date:** 26 September 2019 **venue:** UN Headquarters **location:** New York City, US **contact:** UN Financing for Development Office, DESA **www:** <https://undocs.org/A/72/L.66>

Global Science, Technology and Innovation Conference (G-STIC) 2019: G-STIC aims to accelerate the development, dissemination and deployment of technology innovations that enable the achievement of the SDGs. Themed, ‘Creating an Impact on the Achievement of the SDGs,’ G-STIC 2019 will build on the results of previous editions, and further discuss the policy changes needed for the technological transition to sustainable societies. **dates:** 20-22 November 2019 **location:** Brussels, Belgium **www:** <https://2019.gstic.org/>

Third UN World Data Forum: The UN World Data Forum emerged from a recommendation in the report titled, ‘A World That Counts,’ which was presented in November 2014 by the UN Secretary-General’s Independent Expert and Advisory Group on Data Revolution for Sustainable Development. The UN Statistical Commission agreed that a UN World Data Forum on Sustainable Development Data (UN World Data Forum) would be the suitable platform for intensifying cooperation with various professional groups, such as information technology, geospatial information managers, data scientists, and users, as well as civil

society stakeholders. **dates:** 18-21 October 2020 **location:** Bern, Switzerland **contact:** UN Statistics Division, DESA **www:** <https://undataforum.org/>

Fifth Session of the UN Environment Assembly (UNEA-5): The fifth session of the UN Environment Assembly (UNEA-5) is expected to take place during the last week of February 2021, in Nairobi, Kenya, as agreed during UNEA-3 in December 2017. By the text, the Assembly decided that going forward, UNEA will convene during the last week in February, unless otherwise decided by UNEA. **dates:** February 2021 **location:** Nairobi, Kenya **contact:** UNEP **www:** <http://web.unep.org/environmentassembly/>

Glossary

CCAC	Climate & Clean Air Coalition
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
ESA	European Space Agency
GEIDCO	Global Energy Interconnection Development and Cooperation
GEO	Global Environment Outlook
GRO	Global Resource Outlook
IFA	International Fertilizer Association
IPCC	Intergovernmental Panel on Climate Change
IRP	International Resource Panel
SDGs	Sustainable Development Goals
SEE	Society of Entrepreneurs and Ecology
SMEs	Small and medium-sized enterprises
SPBF	Science-Policy-Business Forum on the Environment
UNEA	the United Nations Environment Assembly
UNEP	United Nations Environment Programme
WMO	World Meteorological Organization



Participants were treated to a reception at the close of the Forum