EoE Bulletin

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Summary of the Eye on Earth Symposium 2018: 22-24 October 2018

The Eye on Earth (EoE) Symposium 2018 was held from 22-24 October 2018 in Dubai, United Arab Emirates (UAE). The event gathered experts to discuss evidence-based decision making for environmental and natural resource aspects of sustainable development. Discussions focused on catalyzing and strengthening multilateral partnerships, including:

- data infrastructure;
- capacity development; and
- access to information.

Organized to facilitate knowledge exchange and networking opportunities, the Symposium was convened by the Environment Agency-Abu Dhabi (EAD), a co-founder of the Eye on Earth movement, in partnership with the UAE Federal Competitiveness and Statistics Authority and the Eye on Earth Alliance. The event took place in parallel with the 2nd UN World Data Forum, which was organized by the High-Level Group for Partnership, Coordination and Capacity-Building for the 2030 Agenda for Sustainable Development (2030 Agenda) and the Statistics Division of the UN Department of Economic and Social Affairs, under the guidance of the UN Statistical Commission.

The Eye on Earth Symposium was a combination of presentations, Q&A sessions, panel discussions and interactive workshops. Over the three-day event, around 500 remote participants were able to hear and speak during the sessions, which were broadcast and will remain available for future consultation at: https://eye-on-earth.net

A Brief History of the Eye on Earth Symposium

Barriers to accessing information, such as limited monitoring and data collection initiatives, lack of coordination among data providers, cost of accessing data sets, and the cost of technology to process and use data, can result in ineffective decision making and policy implementation. Failure to overcome these barriers may result in the loss of valuable environmental assets and resources, particularly in emerging economies.

Concerned that many scientists, policymakers, and private citizens must rely on limited and poorly presented environmental data the Abu Dhabi Global Environmental Data Initiative (AGEDI), in partnership with UN Environment, initiated the EoE process in 2011 as they set out to tackle challenges such as water scarcity, food security and climate change.

EoE aims to mitigate the paucity of stakeholder-relevant environmental information and the lack of adequate technology to process and use data, which hinders sustainable development, particularly in developing countries.

EYE ON EARTH 2011: The first EoE Summit convened in December 2011 and was facilitated by AGEDI to inspire a search for unified, global solutions to the issues that preclude access to data. The resulting Eye on Earth Summit Declaration, with its 14 guiding principles, was adopted and forwarded to the UN Conference for Sustainable Development (Rio+20) for consideration. The Declaration, endorsed by 48 countries, agrees to advance EoE collaboration on, inter alia: a cooperation agenda involving a diverse range of stakeholders; effective mechanisms for collecting, managing and disseminating necessary environmental information; and public access to environmental information. Three foundations and five thematic Special Initiatives were launched at the Summit. The eight Special Initiatives, which form the work programme of Eye on Earth, are: Eye on Access for All; Eye on Environmental Education; Eye on Global Network of Networks; Eye on Biodiversity; Eye on Community Sustainability & Resiliency; Eye on Disaster Management; Eye on Oceans & Blue Carbon; and Eye on Water Security.

EYE ON EARTH ALLIANCE: In 2014, EAD and UN Environment invited the Group on Earth Observations (GEO), the International Union for Conservation of Nature (IUCN) and the World Resources Institute (WRI) to form the Eye on Earth Alliance with the objective of streamlining funding and grant-making capacities related to data analysis.

EYE Of EARTH SUMMIT 2015: Under the auspices of the Eye on Earth Alliance, a second EoE Summit was held in Abu Dhabi, convening over 650 experts and practitioners to propose practical solutions to close data gaps that currently hinder decision making on sustainability action and tracking of progress towards the Sustainable Development Goals (SDGs).

In This Issue

Report of the Symposium

Opening Welcome

On Monday 22 October 2018, the EoE Symposium opened hosting around 100 participants on the sidelines of the 2nd UN World Data Forum. Razan Al Mubarak, Secretary-General, EAD and host of the EoE Network Coordination Unit, welcomed all delegates, underscoring the Symposium's aim of addressing information-related obstacles to sustainable development, based on the principle of free, open and accessible data that contributes to the 2030 Agenda. Al Mubarak reminded delegates that the programme was defined and organized by the global community of experts, who share the Eye on Earth Mission and Vision.

Francis Gassert, WRI, highlighted that data platforms, such as Global Forest Watch and Resource Watch, enable informed decision making and accountability.

Steven Ramage, GEO, drew attention to GEO's work in co-design and co-production of knowledge, as well as to the value of the symposium in building engagement among members of the international Earth observation community.

Alexandre Caldas, UN Environment, highlighted environmental challenges such as ocean plastics and food waste, emphasizing the agency's strong commitment to launch a big data initiative to support action for change.

Thomas Brooks, Chief Scientist, IUCN, noted the EoE Symposium is timely, as the Aichi Targets on biodiversity have 2020 deadlines.

He called on all concerned to support building capacity for data collection in countries, noting that, while the possibilities offered by new technologies are expanding rapidly, they cannot take the place of real people in the field.

Improving and Harmonizing Air Quality Data to Map Health Impacts of Air Pollution: Featuring a Case Study from Abu Dhabi

Mazen Malkawi, World Health Organization (WHO) Regional Center for Environmental Health Action, chaired and presented at this session. He highlighted that air pollution causes at least seven million deaths per year around the globe, noting uncertainties in data collection and problems of communicating about this threat. He described some of the main steps in health risk assessment of air pollution conducted by the WHO and recommended collaboration on data gathering beyond the health sector; the creation of a national committee; and improving disaggregated data in the Middle East, notably data related to mortality and morbidity.

Ruqaya Mubwana, EAD, outlined the agency's integrated approach to monitoring air quality, noting the cross-border nature of events such as dust storms. She highlighted the agency's laboratory for testing and calibration, accredited under ISO 17025. She mentioned examples of multi-stakeholder projects, including: schools that use raw data from her agency's air quality monitoring website, www.adairquality.ae, to generate environmental information about their localities; an "E-linking Initiative" that has established cooperation for data sharing among six environmental monitoring networks, giving all partners access to data from a total of 54 monitoring stations; data collection partnerships with polluters in sectors including electricity generation, shipping, and agriculture and livestock husbandry; and data analysis to understand which are the largest sectors contributing to air pollution.

In the ensuing debate, Malkawi replied to questions from the audience and from online participants discussing the scarcity of data on the impacts of indoor pollution and stressed the need

Opening session of Eye on Earth Symposium on Monday 22 October. L-R: **Thomas Brooks**, Chief Scientist, International Union for Conservation of Nature (IUCN); **Steven Ramage**, Group on Earth Observations (GEO); **Francis Gassert**, World Resources Institute; **Razan Al Mubarak**, Secretary-General, Environment Agency - Abu Dhabi (EAD), and host of the Eye on Earth Network Coordination Unit; and **Alexandre Caldas**, UN Environment. ©EoE

for investing in long-term solutions, including: public transport, behavioral change, and clean energy. In response to participants' questions, Mubwana highlighted that data can be accessed through an application process and signing of a confidentiality agreement.

Data Challenges and Opportunities for Implementing the SDGs in the Arab Region

Adel Farid Abdel-Kader, Trend Green Knowledge, Canada, chaired the session and presented on "Institutional Coordination for Implementing the SDGs in the Arab Region."

Wafa Aboul Hosn, Chief, Economic Statistics, UN Economic and Social Commission for Western Asia (UNESCWA), discussed the status of environment-related statistics on SDGs in the Arab region. Focusing on indicators and the processes that are necessary to make data more tangible, she underscored the need to bring stakeholders together to review the indicators, translate them into Arabic and further contextualize them within the SDGs. She highlighted gaps in data production in the Arab region and the need for capacity building, noting problems with data collection and inconsistencies among agencies. In conclusion, she stressed the importance of enhancing infrastructure and technology in Arab countries for the use of geospatial data.

Farah Shoucair, UN Development Programme (UNDP), spoke on the experience of the Arab Development Portal with SDGs data, focusing on monitoring frameworks, specifically for governments and public institutions. She highlighted improvements in data management analysis by data consumers, underscoring the engagement of the youth and journalists in this platform. She argued that information dissemination is key for the success of the initiative. Discussing the "Open Data Barometer," which analyzes the status of open data in the Arab region, she affirmed that Tunisia is the best performer. She concluded highlighting that estimates suggest that 90% of the data in the world has been created in the last two years (2016-2018).

Mazen Malkawi, WHO-Regional Center for Environmental Health Action, stressed that understanding the impacts of environmental risk on health is complex and requires access to three different datasets on population, health and environment. He called for strengthening stakeholder capacity to overcome siloed approaches to data gathering.

Abdel-Kader discussed coordination challenges, noting that most countries have established inter-ministerial mechanisms, such as national committees on sustainable development, but rarely have national councils for sustainable development. He recommended countries consider which issues need to take priority. He noted that incentives to coordinate are often lacking and that institutional reforms are needed in most structures and recommended that governments focus on developing data portals that can be populated by other actors.

During the discussion, participants asked how environmental conventions are integrating their reporting with SDG reporting processes and what incentives exist to do so. Speakers noted "positive competition" among governments, as they take note of what others are doing and adopt similar measures in their own countries. They suggested promoting goal ownership and harmonizing reporting processes to reduce the reporting burden on countries.

Global Environmental Education Partnership: Building a Global Champion for Environmental Education

Judy Braus, Executive Director, North American Association for Environmental Education (NAAEE), spoke on several initiatives related to environmental education, highlighting: experiential learning as key for successful education practices; lifelong education should be a goal for all and not only for young people; and systems thinking is required for successful practices promoting education for a sustainable future. Drawing attention to the importance of non-formal institutions and decentralized approaches, she argued that the ability to look at the "big picture" and critical thinking are what make education powerful. She invited delegates to join "A Global Call to Action," stating that environmental education has never been so needed and that it provides hope to drive change to counter the current scenario of dangerous levels of environmental degradation.

Melissa Hopkins Taggart, NAAEE, presented the work of the Global Environmental Education Partnership, which is committed to advancing environmental literacy. She underscored that the Partnership supports policies, connects people, and shares best practices, adding that the goal of this learning network is to build bridges among experts and citizens. She also argued that the ultimate goal of education is to drive change and described the achievements of the National Educator Training Grant and the Natural Start Alliance for early child education. She emphasized that funding remains the major barrier for environmental education and announced efforts to overcome this challenge through collective fundraising.

Gayatri Raghwa, Executive Director, Wild Ecologue, stressed that the challenges of climate change, as described by the latest report from the Intergovernmental Panel on Climate Change, will require "the wisdom of many" to address. She suggested that, in the field of environmental education, "ego action" must be replaced by "eco-action," and encouraged everyone to sign the Global Call to Action to work toward three goals: for every nation to have an environmentally informed, empowered and active population and workforce; for the leadership of every government, business, non-governmental organization (NGO) and educational institution to use environmental education to achieve environmentally sustainable outcomes; and for every educational institution to incorporate environmental literacy into its mission, goals and activities.

In the ensuing debate, Braus highlighted the need for funding for environmental education and drew attention to the possibility of accreditation of university programmes for environmental education through the Global Environmental Education Partnership affiliates.

Global Forest Link: Engaging Youth Worldwide in Collaborative Environmental Analysis and Decision Making

Elena Yulaeva, Director, Community Commons, introduced the Global Forest Link project, which engages school-age youth in project-based learning. She noted that the project involves young people in citizen science and aligns with EoE's guiding principles, such as improving equitable access to information,

and providing effective mechanisms for collection of information. Yulaeva underscored that the digital stories produced by project participants also support SDG 4 on education, SDG 13 on climate action, and SDG 15 for life on land.

Yvonne Marie Andrés, Director of Education and Outreach, Global Forest Link, addressed the meeting via video link. She outlined the US Next Generation Science Standards in education, which hold that science "content" cannot be learned in isolation, and are reorienting science education towards problem-solving skills. She explained the project encourages documentation through photos and videos, meta-tagging of data, and linking with experts. Andrés also argued that information "becomes so much more powerful" when shared with an audience, and highlighted how the project connects what is going on in students' communities with global trends.

Yulaeva recalled that the project began in 2015, and more than 1,900 students from the US, Brazil, Ecuador, Georgia and other countries have taken part. She noted that students can connect to the Global Forest Watch platform to view data on the locations that they have studied.

In response to questions from the audience, Yulaeva explained that anyone can access the data from the Global Forest Link site, and that local land-use managers have made use of some of the data and stories generated through the project. Participants further discussed the possibilities for working with the Indigenous Knowledge Bank in Africa, which is one of the UN partnerships for the SDGs, and to secure funds to enable partnerships with organizations on the African continent.

Application of Earth Observation Data to Support Robust Investment Decisions in the Face of a Changing Climate

Tanzeed Alam, Managing Director, Earth Matters Consulting, chaired the session and introduced the discussion, recalling not only the urgency of the climate change threat but also the opportunities to act on sustainability.

Steven Ramage, Group on Earth Observations (GEO), spoke on the work of his organization, which is to promote Earth observations for informed decision-making. He underscored GEO's work in representing more than 100 Member States and other major organizations cooperating to coordinate data sharing for action. On policy areas, he underscored key work areas in relation to the 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction and the Paris Agreement on Climate Change. He underlined gaps in land data; shared experiences with the GEO Carbon and GHG Initiative; and shared examples of initiatives that are tracking the impacts of climate change, biodiversity loss and plastic pollution, highlighting the GEO Human Planet Initiative and the GEO Global Water Sustainability Initiative. He concluded stressing the importance of collaboration, capacity building, communication, and commercial engagement to promote solutions for a changing climate.

Jed Sundwall, Global Open Data Lead, Amazon, shared his company's vision to lower the cost of knowledge. He stressed that, if data is available in the cloud, work can be accomplished faster and at lower cost. He said many customers rely on data access to produce their services and explained that data acquisition can be burdensome due to data storage issues and weak Internet capacities. He concluded by sharing success stories, including an account of Amazon Web Services' support for the work of the US National Oceanic and Atmospheric Administration (NOAA) in using radar to track animal migrations. He explained that tracking the movement of individual animals over long distances represents a data challenge, and that the collaboration has resulted in one of the largest datasets describing animal movement ever compiled, which is available in the archive of the Next Generation Weather Radar System.

Michael Brewer, NOAA, addressed the meeting by video link, speaking about the value of NOAA's National Centers for Environmental Information weather and climate data. He highlighted the range of near real-time environmental information that is available through the organization at scales from local to global. He cited examples of how the data is being used: by insurance companies to determine the cost of crop and disaster insurance; by power companies to minimize grid system weaknesses and avoiding blackouts; by delivery companies to decide which airports are suitable transport hubs; by retailers to predict which food products should be on supermarket shelves; and by corn farmers to determine the appropriate amount of fertilizer to apply, thus minimizing cleaning costs of nitrogen run-off into rivers.

John Firth, CEO and co-founder, Acclimatise Group Ltd, also addressed the meeting by video link. He described his work of enabling banks to better understand and disclose the impacts of climate change on fiscal risk, using cloud-based computing capabilities. He noted that the "headroom" or safe margin of operation has shrunk due to greater climate variability, and that information is needed not only about climate, but also about society, the economy and the environment. He emphasized that this would be impossible without access to Earth observation data, which is fundamental to how society responds to a changing climate.

During a Q&A session, discussions, Ramage noted that a changing climate "rewrites the rules of the way that this planet works," arguing that what is needed is both new data and new analysis. Sundwall underscored growing opportunities to drive change in many countries through making data available to diverse users and going "beyond academics." On challenges for capacity development, panelists underscored that behavior change is not always driven by data, adding that free and open data enables multiple stakeholders to act. In summary, panelists agreed that data must be used to change the status quo and build bridges across different communities to fight climate risks.

Gender Disaggregated Data in Natural Resource Management

Egline Tauya, Southern African Research and Documentation Centre, described the work of her organization in gathering gender-disaggregated data through interviews and separate focus group discussions with women and men. She welcomed the UN Global Gender and Environment Outlook report produced in

2016, noting that some UN reports on SDG implementation do not capture the gender dimension, for example, with regard to access to water and sanitation, impacts of natural disasters, and premature deaths from ambient air pollution.

Giving examples of women's involvement in wetland management through their activities in fishing and basket weaving, she stressed that reporting gender-disaggregated data is key to effective natural resource management and achieving the SDGs. In response to questions from the audience, she suggested that raw data from research are often gender-disaggregated but this information is lost when the data are processed.

The Biodiversity Indicators Partnership Dashboard: Tracking Trends for Conservation

Mike Gill, NatureServe and Co-Chair, GEO-Biodiversity Observation Network (GEO BON), introduced the debate and chaired the session.

Thomas Brooks, Chief Scientist, IUCN, provided the background for the establishment of the Biodiversity Indicators Partnership (BIP) Dashboard. He noted that in many decades of experience, opportunities to better track indicators at the national level emerged, highlighting the way biodiversity indicators are monitored and impacted by new governance frameworks.

Explaining the challenges of tracking and reporting biodiversity targets, Gill noted, for example: poor data quality; lack of evidence-based indicators in the Convention on Biological Diversity (CBD) national reports; a "disconnect" between recommended indicators and their use; overlapping processes; inefficiencies in terms of accessing data; and lack of trust in the indicators. He noted that BIP tries to overcome these challenges through building relationships with its 64 partners and adapting this tool based on a consultative process with users.

A presentation on behalf of Sheila Vergara, ASEAN Centre for Biodiversity, delivered by Gill, highlighted improvements made to the format of the ASEAN Biodiversity Outlook reports. The presentation noted that the third Outlook report, currently in planning, will include data visualizations, real-time maps and a dashboard presentation showing each ASEAN country's achievements toward the CBD Aichi Targets.

Julius Muyizzi, National Environmental Management Authority of Uganda, presented via video link. He emphasized the value of the BIP dashboard in reporting national biodiversity achievements through its "one-stop center."

Responding to questions, Gill noted that some countries select the BIP indicators they wish to use in their own national reports, while also using other national indicators. He noted the challenge of bridging the "trust gap" on indicators and methodology and affirmed the possibility that targets could be tracked in real-time, allowing for more up-to-date reporting.

Environmental Conventions Index: Measuring the Implementation of Global Environmental Conventions

Maria Ivanova, University of Massachusetts Boston, chaired the session noting its focus on data analysis for policy makers. She argued that the key challenges for multilateral environmental

agreements (MEAs) are implementation and effectiveness. She highlighted conceptual, empirical, and methodological gaps to justify further analysis of international cooperation.

Natalia Escobar-Pemberthy, Universidad EAFIT, detailed the methods of the Environmental Conventions Index, which tracks implementation rates of MEAs dealing with chemicals (Basel and Stockholm), wetlands (Ramsar), and wildlife protection (CITES). She explained some of the indicators that were extracted from reporting templates (financial, information, management, regulation and technical) and argued that, despite some variation, lack of reporting remains the most critical issue when tracking compliance of global agreements.

Peter Katanisa, Ministry of Environment, Rwanda, presented his country's progress on implementation of global agreements, noting that best practices include mainstreaming the implementation of such agreements into national development programmes and conducting regular reviews. He outlined challenges such as limited data availability and inadequate and inconsistent funding for implementing agreements.

During the discussion, Escobar-Pemberthy suggested that factors influencing countries' implementation of global agreements include their level of development and the nature of the problem being addressed. She explained that there are many obligations on countries to produce technical data such as inventories of pollutants and that Ramsar is the only convention to require spatial data to be provided. Guisse added that infrastructure issues hamper countries' ability to complete online reporting as they face Internet and electricity challenges.

Ivanova concluded that the ultimate aim is to make reporting available in a public and "consumable" format to promote accountability and input from other actors such as NGOs and academics.

The World Situation Room - UN Environment's Response to the Data Revolution

Alexandre Caldas, UN Environment, presented the Initiative on Big Data on Environment for Sustainable Development and Humanitarian Action. He highlighted the Initiative analyzes data, maps trends, creates scenarios and identifies emerging issues that would help with prevention and data modeling. He said that availability of data that is open, timely and disaggregated is crucial but remains challenging for most countries. Recalling that big data is about "volume, variety and velocity," he summarized stating that the Initiative is "above all" contributing to foresight, early warning and rapid responses.

Charles Sebukeera, UN Environment, stressed the importance of keeping information brief, visual and relevant for policy makers, and described the implications of environmental change in terms of the human impacts.

James Donovan, CEO, ADEC Innovations, described his company's mission of using data to promote better and more informed decision making. He stressed the importance of communicating environmental information as a "value proposition" for business people to promote investments.

Responding to participants' questions, Caldas noted that partnerships are aiming to avoid replicating any ongoing work, and that there is "a long way to go" with regard to realizing the potential of citizen science. A participant from the WHO suggested that citizen science could help validate the quality of information on the health impacts of air pollution, exposure to toxic chemicals, and access to water and sanitation services. Another highlighted that EoE could promote the value of existing data through its webinars and by acting as a platform for dissemination. Caldas added that public funds could be leveraged to access additional funds of greater value from the private sector. Participants further discussed whether such data should be offered for commercial applications at "a reasonable fee," with one participant adding that the value created through public investment in data should be "somehow returned to the public."

Engagement and Big Data: The Citizen Science Contribution to the UN SDGs

Anne Bowser, Woodrow Wilson International Center for Scholars, Citizen Science Global Partnership, chaired the session and provided an overview of the Citizen Science Global Partnership and Earth Challenge 2020, which will help fulfill the goal of engaging millions of global citizens in collecting one billion data points on issues including air and water quality, pollution and human health. She underscored that citizen science promotes transparency, decision making and education, as well as global capacity building of civil society.

Martin Brocklehurst, European Citizen Science Association, set the context of the work of the Citizen Science Global Partnership, alerting the audience to the unprecedented risks that climate change is posing to societies. He called for engaging people in a movement of "one billion citizen scientists," saying that they could be more agile and could deploy cheaper and quicker ways to produce data. Stating that citizen science is the future, he gave the example of the Global Mosquito Alert Consortium, which makes citizens providers of solutions for public health challenges. He described the quick process for developing standards to monitor mosquitos, proving the viability and utility of citizen science tools.

Libby Hepburn, Chair, SDG and Citizen Science Working Group, Atlas of Life in the Coastal Wilderness, Australia, spoke on the formation of citizen scientists. She added that there is still a need for more metadata and greater cooperation with global organizations, notably the UN. On the benefits of citizen science, she stressed its contribution to awareness raising and information for practitioners, who benefit from data availability at lower costs. She concluded underscoring the need for enhancing ways to demonstrate the quality of data collected by regular citizens.

Rosy Mondardini, Managing Director, Citizen Science Center Zurich, gave examples of successful citizen science contributions to monitoring the SDGs. She mentioned an Australian project that involved students in collecting marine debris along the Australian coast, relevant to SDG 14, which had published the results in a peer-reviewed paper, concluding the data collected by citizens was of the same quality as that collected by scientists. Other examples that she highlighted included citizen monitoring of water quality and air pollution indicators. She noted that citizen science projects not only collect data but also produce outcomes in awareness and behavior change.

Participants raised questions about data security and how to address privacy concerns. Speakers highlighted protocols that: separate the core databases from the public platforms used to submit data; anonymize data; and automatically send permission requests to data owners if someone applies to use their data. They also discussed ways to build the credibility of citizen science and promote its use in policy making, noting examples of relevant institutional frameworks and partnerships between governments and civil society in the US, Ireland, Scotland and Finland.

Implementation and Applications of the IUCN Red List of Ecosystems

Veronica Ruiz, IUCN, chaired the session, which was an interactive panel and a training workshop for participants, including almost 70 online attendants. She noted that the IUCN Red List of Ecosystems (IUCN-REL) provides a baseline to support conservation in resource use and management decisions by identifying ecosystems most at risk of biodiversity loss, in addition to the IUCN Red List of Threatened Species.

Jon Paul Rodríguez, IUCN, spoke on the past, present and future of the IUCN-REL, indicating the paper "Scientific Foundation for an IUCN Red List of Ecosystems" as its foundational document. Panelists explained that IUCN-REL evaluates changes in ecosystem distribution and function, using quantitative measures to identify areas that need fast and effective action.

UN Biodiversity Lab: Empowering Policymakers to Use and Apply Spatial Data

David Jensen, UN Environment, explained the origins of the UN Biodiversity Lab, a joint project of UN Environment, the CBD and the UNDP. He demonstrated the capabilities of the mapx.org platform in aggregating spatial information, highlighting its features including neutrality of information as the UN plays a role as a trusted "data broker," user privacy, no re-selling of data, and a private and secure cloud-based workspace. He highlighted the value of spatial data in supporting the global governance framework for managing environmental change, noting that 80% of all the main environmental conventions do not require any spatial reporting, and that there is a lack of consistency in reporting of conventions, with just half of all countries on average reporting on implementation, while 20% of countries are not reporting at all. He stressed that available technology can transform the global governance framework, in particular the open-source data movement.

Annie Virnig, UNDP, presented the results of a study of how policy makers use spatial data in conservation planning. She reported the study had found that respondents on average had four maps or fewer in their plans, and just 20% of respondents had "actionable maps" showing where they would take preventive or restorative action. She emphasized the potential of the UN Biodiversity Lab to level the playing field across countries with different technological capabilities and to inform

conservation and development activities. She noted that the platform also allows for countries to set up private spaces and upload national and regional data layers, stressing the platform is a free tool that does not require Geographic Information Systems expertise. She concluded highlighting that this work enables spatial literacy to enhance decision making and can be used to influence the world's plan for biodiversity for 2020-2030.

In discussion, participants raised questions about the need to ensure appropriate attribution of data sources by the platform and how to systematize the use of data in government. Virnig mentioned a current project whereby the Biodiversity Lab is cooperating with NASA in eight pilot countries to extend its impact on the ground.

System of Environmental Economic Accounting: Serving Environmental Policies for Sustainable Development and the SDGs (Part 1 the SEEA Central Framework)

Wafa Aboul Hosn, UNESCWA, chaired the session and introduced the System of Environmental Economic Accounting (SEEA), an international statistical standard that integrates environmental and economic data to provide a more comprehensive and multipurpose view of the relationship between the environment and the economy.

Risenga Maluleke, UN Committee of Experts on Environmental Accounting and Deputy Director-General of Statistics, South Africa, highlighted challenges of data scarcity and funding for statistics in developing countries, emphasizing the opportunities to support the enhancement of statistics through technical assistance and opportunities for improving data collection in the water sector.

François Soulard, Environmental Accounts and Statistics Program, Statistics, Canada, spoke on the implementation of SEEA in Canada. He noted the use of geospatial data that includes information on social and economic aspects enables analysis related to social fairness. He showed that Canada, during 2011-2015, had not reduced its greenhouse gases emissions, stressing SEEA as an effective tool for policy making.

Ali Bu'haroon, Federal Competitiveness and Statistical Authority, UAE, outlined the agency's activities to produce energy and environment accounts for the first time, drawing on surveys and administrative data. He expressed hope that future accounting will cover health, education, and other sectors.

Jillian Campbell, UN Environment, presented the possibilities for using satellite data for land accounting. She noted there is no "one-stop shop" that will provide all the needed data for such an exercise and that countries will need to: produce national definitions of the various categories of land to be identified, such as "cropland" and "grassland"; draw on a combination of ground and satellite data; and supplement in-situ data with data derived from modeling, as needed. She concluded that, while satellite data can provide some useful input, countries will need to supplement this with land data of their own in order to produce reliable accounts.

In discussion, participants raised questions about how to get governments to resource SEEA. Soulard noted that accounting for material stocks and flows has been addressed at least since the 1990s and that work is now starting on oceans data. Other speakers suggested that SEEA could be seen as contributing to accountability in general. They discussed the challenge of accessing local-level data and the possibility of aligning data collection requirements with regional processes.

System of SEEA: Serving Environmental Policies for Sustainable Development and the SDGs (Part 2 Ecosystem Accounting)

Wafa Aboul Hosn, UNESCWA, moderated the session. Roberto Olinto Ramos, President, Brazilian Institute of Geography and Statistics, suggested that more work on the governance components of data gathering is needed. He stressed the need of partnerships to work on SEEA and cautioned against the influence of politics in statistical work.

Thomas Brooks, IUCN, emphasized the importance of experimenting with the application of SEEA at the national level and on various themes. He recommended enlarging the scope of SEEA's biodiversity definition to align with CBD's terminology. He recommended having separate accounts for ecosystems and species, highlighting the IUCN-REL tool as an advanced baseline for this practice.

Pali Lehohla, University of Johannesburg and Pan African Institute for Evidence, spoke on SEEA implementation in South Africa. He warned against the interference of politics in statistics and recommended giving more attention to institutional challenges. He considered SEEA as a "catalyst" for overcoming problems with independence and autonomy, essential elements to achieve the SDGs.

François Soulard, Environment Canada, presented a methodology framework that identifies ecosystem extent, condition, services and benefits, among other features. He noted that defining ecosystem types is an important task, which UN Environment, IUCN and some countries are currently working on, so that "opening" and "closing" ecosystem values can be measured. He gave an example of how historic data was used to show the extent of Toronto's urban sprawl since the 1970s, which highlighted that good-quality farmland had been eaten up by urban development, noting that such mapping can be correlated with the introduction of various urban policies to understand policy impacts. He concluded that, while there is currently untapped potential to use SEEA to estimate progress on the SDGs, "constant progress" is needed to build the underlying data. He called for producing a census of the environment.

Steven Ramage, GEO, highlighted the work of the project on "Earth Observations for the SDGs," which is being conducted in cooperation with several UN agencies and the secretariat of the UN Convention to Combat Desertification. He noted that "human interoperability" is an emerging area of focus that seeks to understand human motivations and behavior in the use of systems.

In the ensuing discussion, speakers highlighted the importance of training to promote learning of Earth observation tools, collaboration among actors in the field to ensure that systems are compatible, and using multiple data sources, including in-situ data. Soulard explained that, while there have been discussions of how to value environmental assets, there is currently no consistent body of clearly defined concepts. Aboul Hosn concluded the session acknowledging the leadership given on this area by some countries and suggested that the Arab region could benefit from South-South cooperation in this area.

Eye on Earth delegates discuss using System of Environmental Economic Accounting (SEEA) to serve environmental policies for sustainable development and the SDGs. L-R: **Ali Bu'haroon**, Federal Competitiveness and Statistical Authority, UAE: **Jillian Campbell**, UN Environment; **Wafa Aboul Hosn**, Chief, Economic Statistics Section, UN Economic and Social Commission for Western Asia (UNESCWA); **François Soulard**, Statistics Canada; and **Risenga Maluleke**, UN Committee of Experts on Environmental Accounting and Deputy Director-General of Statistics, South Africa ©EoE

Big Data for Toxic Exposure Assessment and Prevention to Make a Safer World for People, Environment and Wildlife by 2030

Ahmad Mahdavi, University of Tehran, presented the ways in which big data can be used to predict the impacts of toxic chemicals exposure on biodiversity and health, for example, with regard to endocrine disruptors, which have severe impacts on humans and ecosystems. He explained how new statistical methods and analytical approaches can be applied to generate predictions, drawing on significant amount of available data about the toxicity and interactions of various chemicals at different exposure levels. He warned that pesticides cause greater negative impacts in developing countries, where "regulations stop at the border."

SDG Deep Dive

Jillian Campbell, UN Environment, chaired this interactive dialogue among the panelists.

Enrique Ordaz, Co-chair of the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) and Mexico National Institute of Statistics and Geography, spoke on the experiences of Mexico in monitoring the SDGs and on challenges related to indicators that have no internationally established methodology or standards, but methodology/standards are being (or will be) developed (Tier III). He highlighted global efforts to support developing countries, calling for stronger collaboration between national statistics offices and mapping agencies, which are not present in all countries. He recommended improving communications and interoperability of data, so everyone can "speak the same language."

Pali Lehohla, University of Johannesburg and Pan African Institute for Evidence, discussed new advances in technology, which create an opportunity to leapfrog the statistical systems to monitor the environmental SDGs. He emphasized the need to improve trust in data production, noting for the importance of methodological consistency.

Anne Virnig, UNDP, shared experiences with geospatial information, noting funding and targeting policy makers as key barriers to be addressed. She mentioned opportunities related to citizen science projects as tools to lower the costs of data collection and provide real-time information.

Gemma Van Halderen, UNESCAP, provided examples from Asia and the Pacific and described ESCAP's approach to improving environmental statistics and accounting in the region. She reported on stakeholder mechanisms that are improving data collection, noting the importance of international assistance helping some countries "to go from nothing to something." She urged the environmental community to agree on some of the most essential indicators, suggesting land cover as a good starting point.

Olivier Thunus, NSI Luxembourg Werner, remarked on the difficulties in measuring climate change considering that many indicators are outdated, even in Europe. He shared experiences from Europe that are "bringing everyone to the same level," highlighting the need to organize and start a data collection and the need for capacity building training as an effective way to improve data analysis and methodologies.

In the ensuing discussion, the audience from the floor and online debated, among other themes, opportunities with citizen science initiatives and the lack of a business model that could

scale up these initiatives; the need to produce long-term data to respond to the SDGs; and reluctance of the private sector to release data. In response, panelists mentioned that countries must decide what to prioritize within the 2030 Agenda and that the SDGs "call for independent methodologies and enduring data sources."

Expanding the Eye on Earth Impact

In the closing session, Derek Gliddon, EoE Network Coordination Unit and EAD, invited all participants to provide suggestions for future EoE focus. Recalling that the EoE was launched in 2011, he underscored the adoption of the SDGs in 2015 as a signal, underscored in January 2017 by the Cape Town Global Action Plan, of the relevance of its purpose. Several participants highlighted the opportunity for citizen science to complement Earth observation data, based on appropriate data-gathering protocols, and to fill current gaps in SDG monitoring of biodiversity, air and water quality, as well as other goals related to natural resources management. In discussions, they specifically suggested:

 • drawing on EoE capabilities and resources to create a project framework;
 • identifying areas in which EoE intersects with environmental education;
 • seeking funds to connect up participants in citizen science across the globe so that they can have impact beyond the local level and help fill data gaps in monitoring the SDGs;
 • presenting a strong business case to channel USD 1 million to establishing a global citizen science network, based on the model of the Global Mosquito Consortium;
 • collaborating on bids for funding;
 • setting up a system whereby EoE members can cooperate to validate data generated from various citizen science initiatives;
 • developing relationships between EoE and relevant UN bodies such as the UN Environment Science-Policy-Business forum;
 • ensure a gender-balanced advisory group to EoE;
 • integrating greater government representation in future EoE events; and
 • identifying specific audiences and the value added by EoE.
    As the way forward, participants recommended:
 • compiling a searchable directory of the EoE network;
 • creating an online collaboration and communication platform to enable self-defining and self-organizing sub-groups;
 • seeking greater participation of governments and intergovernmental organizations in EoE; and
 • connecting with organizations that promote citizen science initiatives and environmental education.

In closing, many participants expressed their appreciation for the three days of discussions and looked forward to continuing engaging with EoE. Gliddon thanked all for their contributions and concluded the meeting at 6:10 pm.

Upcoming Meetings

Group on Earth Observations (GEO) Week 2018: This gathering of GEO's 105 member governments and 127 participating organizations will explore efforts and opportunities for the use of Earth observations for the benefit of humanity, focusing on GEO's three priority areas: the Sendai Framework for Disaster Risk Reduction, the Paris Agreement on Climate Change, and the SDGs. **dates:** 29 October – 2 November 2018 **location:** Kyoto, Japan **e-mail:** secretariat@geosec.org **www:** http://www.earthobservations.org/geo15.php

Eighth meeting of the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs): The eighth meeting of the IAEG-SDGs will include a meeting of members on 5 November and plenary discussions from 6 -8 November 2018. The IAEG-SDGs was established by the UN Statistical Commission at its 46th session to develop an indicator framework for monitoring implementation of the 2030 Agenda. **dates:** 5-8 November 2018 **location:** Stockholm, Sweden **contact:** UN Statistics Division **fax:** +1 (212) 963 9851 **e-mail:** statistics@un.org **www:** https://unstats.un.org/sdgs/meetings/iaeg-sdgs-meeting-08/

European Space Agency (ESA) Earth Observation Week 2018: This event will review the latest developments in Open Science trends through a variety of events including talks, workshops, roundtables, startup pitches, and hackathons to connect multi-disciplinary communities including Earth observation researchers, data scientists, and technology entrepreneurs. **dates:** 12-16 November 2018 **location:** Frascati, Italy **e-mail:** eoopenscience@esa.int **www:** http://phiweek.esa.int

UN World Geospatial Information Congress (UNWGIC): The UN World Geospatial Information Congress (UNWGIC) will address the theme: "The Geospatial Way to a Better World." This event will bring together stakeholders at the highest level to address and ensure that geospatial information has its widest and fullest utility in service of social, economic and environmental development. The UN Statistics Division, as the Secretariat for the Committee of Experts on Global Geospatial Information Management , in collaboration with the Government of China, through the Ministry of Natural Resources and the Zhejiang Provincial Government, will host the event. In addition to the UNWGIC, which will convene from 19-21 November, events will take place from 19-23 November, including global and regional meetings, workshops and learning events, side events, and the annual (2018) plenary meeting of Member States. **dates:** 19-21 November 2018 **location:** China **additional:** Deqing, Zhejiang Province **www:** http://ggim.un.org/meetings/2018-1st_Congress_Deqing/

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2018 UN Biodiversity Conference: The 14th meeting of the Conference of the Parties to the CBD, the 9th Meeting of the Parties to the Cartagena Protocol on Biosafety and the 3rd Meeting of the Parties to the Nagoya Protocol on Access and Benefit-sharing (CBD COP 14, Cartagena Protocol COP/MOP 9, and Nagoya Protocol COP/MOP 3) are expected to address a series of issues related to the implementation of the Convention and its Protocols. A High-Level Segment is expected to convene from 14-15 November 2018. The CBD COP 14 and COP/MOPs are expected to meet in parallel from 17-29 November 2018. **dates:** 14-29 November 2018 **location:** Sharm el-Sheikh, South Sinai, Egypt **contact:** CBD Secretariat **phone:** +1-514-288-2220 **e-mail:** secretariat@cbd.int **www:** https://www.cbd.int/conferences/2018/cop-14/documents

6th OECD World Forum on Statistics, Knowledge and Policy: The sixth Organisation for Economic Co-operation and Development (OECD), World Forum on Statistics, Knowledge and Policy will convene on the theme, 'The Future of Well-being'. Focal areas are: the digital transformation, the changing role of governance; and business and wellbeing. The Forum is organized by the OECD and Statistics Korea. **dates:** 27-29 November 2018 **venue:** Songdo, Incheon, Republic of Korea **contact:** Secretariat for 6th OECD World Forum **fax:** 82-42-489-7382 **e-mail:** oecd2018@korea.kr **www:** https://unstats.un.org/unsd/statcom/49th-session/documents/RD-OECD-World-Forum-poster.pdf

Katowice Climate Change Conference (UNFCCC COP 24): The Katowice Climate Change Conference will include the 24th session of the Conference of the Parties (COP 24) to the UNFCCC, along with meetings of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol, the Subsidiary Body for Scientific and Technological Advice, the Subsidiary Body for Implementation, and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement. COP 24 is expected to finalize the rules for implementation of the Paris Agreement on climate change

under the Paris Agreement Work Programme. A High-Level Ministerial Dialogue on Climate Finance is expected to be held in conjunction with COP 24. **dates:** 2-14 December 2018 **location:** Katowice, Slaskie, Poland **contact:** UNFCCC Secretariat **phone:** (49-228) 815-1000 **fax:** (49-228) 815-1999 **e-mail:** secretariat@unfccc.int **www:** https://unfccc.int/katowice

Glossary

AGEDI	Abu Dhabi Global Environmental Data Initiative
BIP	Biodiversity Indicators Partnership
CBD	Convention on Biological Diversity
EAD	Environment Agency – Abu Dhabi
EoE	Eye on Earth
GEO	Group on Earth Observations
GIS	Geographic Information Systems
IAEG-SDGs	Inter-Agency Expert Group on SDG Indicators
IUCN	International Union for Conservation of Nature
NAAEE	North American Association for Environmental Education
NOAA	National Oceanic and Atmospheric Administration
SDGs	Sustainable Development Goals
SEEA	System of Environmental Economic Accounting
UNCSD	UN Conference on Sustainable Development
UNEP-WCMC	UN Environment Programme – World Conservation Monitoring Centre
UNFCCC	UN Framework Convention on Climate Change
WHO	World Health Organization
WRI	World Resources Institute