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The Case for a Digital Ecosystem for the Environment

Photo by Markus Spiske

STORY HIGHLIGHTS

- Big data sets and new technologies can be brought together to create new knowledge products that can provide environmental insight in near real-time.

- Now is the time to reimagine and supercharge environmental governance and public-private partnerships by using big data, frontier technologies and data analytics to target our action and investments.

- We need to build on and leverage existing partnerships and practitioner communities to ensure the digital ecosystem for the environment is inclusive and does not overlap or duplicate existing activities.

Working in the environmental field and on natural resources management often puts us in a position where we are making decisions and investing financial and human resources – based on assumptions, anecdotal evidence or incomplete data. However, today we have at our fingertips a combination of global environmental data, technologies and data science tools and techniques that have the potential to create insights that can underpin a sustainable future and profoundly transform our relationship to the planet. These insights can underpin policy and decisions that lead to action and impact, an imperative today.

Now is the time – a pivotal moment in environmental history

Data adds tremendous value to how decisions are made in our daily lives. We can forecast the weather, compare products and services based on user reviews, as well as understand risk and reduce uncertainty for items, such as insurance premiums or financial investments. When it comes to the environment, much of the information needed to make decisions on a global level is not available in a consistent and rapid manner over time. This leaves us with no sound basis for targeting our actions, measuring the impact of our actions on the environment or developing adaptation responses.

Based on a recent UN Environment report, 68% of the 93 Sustainable Development Goals (SDGs) indicators covering the environmental dimensions of sustainable development under the 2030 Agenda cannot be measured due to a lack of data. However, big data sets and new technologies can be brought together to create new knowledge products that can provide environmental insight in near real-time. These include satellites and drones, cloud computing, artificial intelligence, the internet of things, blockchain and a range of open source software and mobile phone applications. We are at a pivotal moment in environmental history where the way in which we deploy these technologies offers the possibility to measure and protect our environment – a feat that we have failed to accomplish over the past forty years. In many ways we need to make a big bet on technological salvation precisely because nothing else has really worked.

People may wonder how we can take such a positive outlook when the chorus from the scientific community is that humanity has around 10 years left to fundamentally change the way we consume natural resources and protect the environment to avoid climate catastrophe, resource scarcity and the 6th global extinction of species. These findings are compounded by population growth and increases in per capita resource consumption and carbon emissions. Moreover, our global environmental governance frameworks are not keeping pace with the rate of technological change – taking longer to negotiate and implement than the lifespan of different versions of the iphone.

Ten years isn't a lot of time to transform our social, political and economic systems to achieve sustainable development. However, the challenge is no longer out there in some distant future – it is happening on our watch – in our lifetime. This is our problem to solve, our responsibility, our success or our failure. This may seem daunting or inflict a feeling of paralysis in terms of where to start, but we should see this time pressure as a source of motivation for individual and institutional leadership.

We must admit that business as usual approaches to global environmental governance are not working and that those approaches themselves require more scrutiny and reengineering. Now is the time to reimagine and supercharge environmental governance and public-private partnerships by using big data, frontier technologies and data analytics to target our action and investments. Our vision is to bring together partners and expert communities to generate environmental insights that governments, the private sector and citizens can use to protect our planet, our prosperity and our global peace. Solutions must be geared to work at a scale, pace and level of incentives that matches the social, economic and technological forces that are leading to environmental decline. They must directly challenge and bring greater transparency to the existing financial systems that benefit certain actors and organizations who offer products that cause damage to our environmental systems. We must create the incentives that catalyze change in their supply chains and product designs while also helping them to find new business models that harness more environmentally and socially responsible activities.

How do we create change?

The members of the UN Science Policy Business Forum working group on Big Data, Analytics and Artificial Intelligence were tasked to think through what a global digital ecosystem for the environment might look like. What partnerships would be needed? What are the key benefits, risks and governance issues? This group of companies, academics, member states, intergovernmental organizations and civil society actors was asked to leverage their collective knowledge to first conduct this initial scoping and then develop a vision and implementation plan for realizing a global digital ecosystem for the environment. Some tough questions were being posed during their deliberations.

How can such a system help fundamentally influence and direct government policy, consumer behavior and global markets towards sustainability in the "remaining" 10-year window? Can humanity navigate the geopolitical and economic challenges of environmental data governance? How can public and private sector actors jointly generate global public goods while avoiding data and technology monopolies and governance processes that lack transparency, inclusion and accountability. If power is increasingly based in data and digital social networks, what is the strategy to leverage and support those networks in driving transformations to deliver global sustainability?

The first flagship discussion paper of the working group was issued and adopted in March 2019 in the margins of the 4th meeting of the UN Environmental Assembly. We had the opportunity to participate in the process and co-author the paper. For both of us, it was the most fascinating process we have engaged with in our respective UN careers. But for the discussion paper to be transformed into a global road map by 2020, it will require coordinated global action, leadership and trust amongst public and private partners. Some of the key messages of this discussion paper are discussed below.

Why we need big data, algorithms and artificial intelligence

The planet desperately needs the best data, technology and processing power that humanity has to offer. If we cannot manage what we cannot measure, big data and frontier technologies can help decision-makers understand if we are on track, as well as assess different tradeoffs and model policy options. Available data was a major limiting factor in the recent global modelling of environmental policy options in the 6th Global Environment Outlook. But first, we need to identify what information is already available and where we can use existing big data and technology to fill information gaps. Then, we need a global effort to stimulate additional data collection, by governments, companies, academics and citizens – in order to ensure that we have the right information for the right decision.

New data streams and technologies such as open data cubes are offering high resolution spatial data to monitor environmental change over time. It is critically important to not only map negative trends, but also determine where investments are needed in mitigation, management or restoration to fundamentally change those trend lines. We must celebrate and scale solutions, not only track declining trend lines and failures.

We also need data and insights on supply chains, natural capital stocks and carbon intensity to inform financial markets and investors about environmental risks and opportunities linked to companies and their products and services. This can range from water, energy and material inputs to disaster risks to infrastructure and suppliers. There is a major transparency benefit to be gained in terms of understanding which companies are contributing to planetary solutions and sustainability and which are not. Blockchain has the potential to add a traceability benefit in terms of tracking global inputs as well as certification and performance standards that have been applied.

Using data science, artificial intelligence and machine learning to increasingly nudge consumers to more sustainable products and more actively consider the environmental footprint of product

supply chains has the potential to change behavior. There are already examples of finding innovative ways to gamify and reward green and low carbon consumption using [fintech and mobile apps](#).

How do we engage people and companies?

Social media has an increasing level of power and influence on attitudes, perceptions and political outcomes. How can it be leveraged in a more strategic way to direct citizen action towards sustainability? How can people be mobilized to collect data on ecosystems, biodiversity and the state of our environment using crowdsourcing and citizen science? How can we get people living in cities to understand the value and beauty of the natural world in order to take action to protect it?

Mobile phones and other data collection technologies now give all citizens the power to connect, be informed and act on environmental problems. How can we use technology to help people understand the implications of biodiversity loss, environmental degradation and climate change in a hyper-local way? We need to help people understand local environmental risks and trends as easily as they understand local weather reports. How is your home exposed to localized air and water pollution and what are the health risks? What environmental risks might impact your favorite park, wildlife species, or natural areas?

We need more aggressive strategies to ensure that messages about the environment are based on science and facts rather than "fake news". We need to understand how effective stories can be told in ways that trigger an emotional response and catalyze action in the real world. The world is not yet using available environmental data and frontier technologies in a strategic and integrated manner to influence markets and consumer behavior, stimulate awareness and action through social media and create policy change. But this is within our reach.

We need partnerships to build the infrastructure for a digital ecosystem for the environment to bring together data, algorithms and insights as a global public good. This will require interoperability across platforms, data sharing, and data

governance, combined with investments in data collection and infrastructure to bring together data with algorithms with software with cloud computing – ideally all based on open source technologies. Data should be accessible, open and analyzed in a way that links to policy, markets, consumer behavior and social media.

What are the risks?

Given these potential benefits, international organizations, civil society groups, academics and governments are already scrambling to partner with the major holders of data and technology (i.e. technology companies). However, in the rush to access data, we should consider the motivation of companies, their underlying business models and their potential intention to lock-in clients to proprietary software creating dependency. Currently, much of the big data and technological advancements are held by a handful of companies. This not only creates imbalance in terms of who has access to use data to make decisions, influence markets and determine investments, but it also creates concerns in terms of privacy. As we go forward in partnerships with technology companies, we need to keep the adage in mind that there is no such thing as a free lunch. The same is true in new partnerships with the largest global industrial and energy firms, where transparency and transformation is crucial to achieving our goals for sustainable development. We need to understand where motivations overlap, or conflict, and when partnerships are appropriate. We also need to construct more agile partnership agreements that allow for either party to exit when values no longer align.

As companies release a swarm of satellites, drones, sensors and