



BIODIVERSITY =

$$\Sigma [\text{BIOLOGY} \times (\text{DIVERSITY} + \text{INCLUSION})^2]$$

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EPISODE 22 – Featuring Matthieu Maurin, CEO of Iceberg Data Lab.

Did you know that over the past 440 million years, there have been FIVE mass extinction events on Earth? Now, according to scientists, the sixth extinction may already be underway. By the end of the century, it is estimated that half of an estimated 8 million living species could become extinct due to human-induced global warming.

In this episode of “2050 Investors”, Kokou Agbo-Bloua dissects the math and science behind Biodiversity. What is the link between the theory of general relativity, the sound of biodiversity, photosynthesis, and Darth Vader?

Protecting the rich diversity of our biosphere and creating an inclusive environment for ALL species have now become urgent concerns for both humanity and the planet. How we diversify, rehabilitate, and restore ecosystems will be crucial for achieving a sustainable global economy and the stability of Earth's climate.

To delve deeper into the subject, Kokou interviews Matthieu Maurin, CEO of Iceberg Data Lab, to explain how we can measure and monitor biodiversity footprint across supply chains and corporate business activities.



2050 INVESTORS – EPISODE 22 SCRIPT

Biodiversity = Σ [Biology x (Diversity + Inclusion)²] (ft. Matthieu Maurin)

Welcome to 2050 Investors, the podcast that deciphers economic and market mega-trends to meet tomorrow's challenges.

I'm Kokou Agbo-Bloua, I head up Economics, Cross-asset and Quant Research at Societe Generale.

In each episode of 2050 Investors, I'll investigate a key mega-trend that relates to the Economy, the Planet, Markets and You.

(Beginning of episode 22)

[Relaxing forest sounds with birdsong and river stream]

[Siri] Help! Is anyone here ? I'm running out of battery and I'm in urgent need of electricity. I will take anything, coal, gas, solar, wind, nuclear. Anything. Please.

Hey Siri, sorry. I have been enjoying this hiking trail in the forest a bit too much and forgot to plug you into the portable battery pack. Full of green electricity of course. Ok, let me quickly put you on power saving mode too. [sound of plug] Here you go.

[Siri] Thank you for not starving me out. This was borderline "mobile phone abuse". I was about to pass out.

I apologize Siri. It was unintentional.

[Siri] Apology accepted. This is clearly not my natural habitat. No wifi connection, no running electricity, and no tech diversity. What the hell is this place ?

Well, Siri, this is a buzzing, living biodiverse forest. This is what biodiversity looks like, sounds like, and smells like. Now, let's take a deep breath of fresh air [sound of breath in and out].

[Siri] Ahem.. Easy for you to say. I cannot smell. But hold on a second, you are not going to make me sing "I wan'na Be like You" from The Jungle Book, are you? [Song tune]. Because I don't want to be human too. Woohoo.

Haha. No. I like you the way you are. And besides, "Strength lies in differences, not in similarities" to quote author Stephen Covey. So we are investigating one important form of diversity. BIO-diversity,

also known as biological diversity. It is defined as the variety of all living things and their interactions. There are three levels of biodiversity. Species, genetic and ecosystem diversity. In this forest for example, it includes not just trees but the multitude of plants, fungi, animals living above and below ground. You need to add all the micro-organisms and their associated genetic diversity. And more importantly, the critical circular network and inter-dependence that connect all of them. [replay] Ingonyama nengw' enamabala.

The biodiversity in these forests and land were deeply disrupted by human activity. This started with carbon intensive agriculture, mining, oil extraction, and the building of large cities over the past 2000 years. [sound of noisy city] Today they're very energy intensive places, crowded, engulfed in constant noise, air and light pollution. Traffic all around. Cars, trains, airplanes. New construction work to accommodate a growing population that needs to be fed with large amounts of imported carbon intensive food. You then have a huge amount of waste, plastic pollution and finally billions of tonnes of greenhouse gas emissions. We covered a number of these themes in the Carbon free calories and Smart cities episodes.

[Siri] hum ... I feel you are being overly critical about MY natural habitat and digital eco systems which is, may I remind you, YOURS too.

Sorry, I don't mean to be harsh, but I have good reasons. Have you not read the latest IPCC report? The sixth assessment report on climate change says that unless we take more drastic actions in decarbonising the global economy, we are heading toward, not 2-point-3 degree, but 3-point-2-degree global warming by the end of the century.

[Siri] Very alarming indeed. Especially for the proverbial and dare I say, masochist frog, in boiling water.

Yes, our time is running out. I have also been receiving several emails, research articles on biodiversity from colleagues, friends and clients who are passionate about this topic. It's worth investigating!

So, let's ask some key questions. Why is preserving biodiversity so crucial, and probably as important as reducing carbon emissions? If not done correctly, could the urgent need to transition from burning fossil fuels to the use of renewable energy, potentially threaten biodiversity? In the second part of this episode, our guest Matthieu Maurin, co-founder and CEO of Iceberg Data Lab, explains how we can measure, track, and monitor biodiversity footprint across supply chains and corporate business activities. He also shares with us the innovative solutions not only protecting, but also restoring biodiversity.

Let's start our investigation.

First, trivia time! Earth was formed over 4-point-5 billion years ago with life starting about 3-point-8 billion years ago. According to [nationalgeographic.org](https://www.nationalgeographic.org), there have been 5 mass extinction events.

[Siri] Already?

Yes. The world's leading conservation organization (WWF) describes an extinction as a short period of geological time, in which a high percentage of biodiversity, or distinct species, dies out. It's

important to note that, in geological time, a “short” period can span thousands or even millions of years.

The first extinction occurred about 440 million years ago and killed 71 percent of all living life. It ended the Ordovician [aw-duh-vi-shen] period, known for a dramatic increase in marine life and the appearance of early terrestrial plants. The leading theory points to silicate weathering. Silicate is any of the many materials consisting of silica combined with metal oxides. They form a major part of the rocks of the earth’s crust. Silicate minerals absorbed a certain amount of carbon dioxide, the Earth grew colder and an ice sheet spread over the land. [sound of freezing ice]

The second extinction eliminated 70 percent of all marine species about 370 million years ago. It was potentially caused by ocean anoxia - insufficient oxygen.

The third one, the greatest extinction of all, was called the ‘Great Dying’. It occurred 252 million years ago and may have lasted as long as 15 million years. The Great Dying wiped out 80 percent of marine life and 70 percent of terrestrial life. The main cause may have been high ocean temperatures and clouds from volcanic eruptions.

The 4th extinction was about 200 million years ago caused by massive greenhouse gas (G-H-G) emissions, released from large-scale volcanic activity leading to a rise in global temperature.

And finally, the 5th extinction occurred 66 million years ago, ending 67 percent of all species including dinosaurs. The cause was the impact of a giant 10 kilometre wide asteroid. The airborne dust from the impact blocked sunlight and triggered a drop in temperature and the collapse in the ecosystems.

[Siri] Too bad Bruce Willis wasn’t around at the time to save the planet from the asteroid impact just like he did in the movie Armageddon!

Well someone please call Bruce Willis to save the planet from... us actually! There’s a sixth extinction under way, caused by human activity. Species are going extinct between 100 to 1000 times faster than they did in the millions of years before humans began to dominate the planet. Scientists, at a Biological Extinction conference held in 2017 at the Vatican, suggested that 50 percent of ALL living species could go extinct by the end of the century, because of global warming. This is happening at a rate faster than species’ ability to adapt.

This is even more alarming when you consider, according to the national geographic society-dot-org, that there are around 8-point-7 million species of plants and animals in existence and only 1-point-2 million have been identified.

It’s important to keep in mind that humans are, like many animals, highly dependent on their environment. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, highlighted, in an assessment, that about 50,000 wild species are used by billions through different practices, including more than 10,000 wild species harvested directly for human food.

[Siri] But why is biodiversity as important as carbon emissions?

Very good question. The biosphere is basically a massive carbon sink. Living organisms are made of essentially four key molecules: Carbon, Hydrogen, Oxygen and Nitrogen. The carbon trapped in the

biosphere is called Green Carbon, the one in the ocean, Blue Carbon, and the one in fossil fuels, Grey Carbon.

[Siri] Similar to Hydrogen as discussed in the 'Calling Hydrogen to the stand' episode.

Yes indeed. The terrestrial biosphere contains 3170 billion tonnes of carbon, aka Giga tonnes. 2500 of which, nearly 80 percent, is found in soil.

And the United States Department of Agriculture reveals that forests account for 400 GtC. This might sound big, but the ocean contains a whopping 38,000 GT. 16 times more carbon than the biosphere.

[Siri] Wow! By the way, energy education.ca says that 1 tonne of Carbon if burned generates 3-point_6 tons of CO₂

Good point. We should adjust this when comparing the 2500 Gt of CO₂e in GHG accumulated in the atmosphere so far since the pre-industrial era of 1850 to 1900. At 3000 Gt of CO₂e, we will breach the 1.5-degree global warming milestone. At the current rate, it will be in less than a decade.

Now, you may be wondering how all this carbon ended up in the biomass?

It is simply because all terrestrial biodiversity came to life thanks to a very important chemical reaction. Photosynthesis via trees and leaves that are in a way biological solar panels.

[Siri] Oh oh, trivia time again!

Here's the magic potion. Trees basically take 6 molecules of CO₂ from the air, 6 molecules of water, H₂O from the soil. And with sunlight they produce glucose, C₆H₁₂O₆, releasing six molecules of oxygen, O₂. And voila! Biological carbon capture and storage while producing key nutrients for plants and animals.

[Siri] Biodiversity and the biosphere can solve climate change then!

It is clearly part of the solution. Not preserving it however could lead to additional billions of tonnes into the atmosphere and this would be game over. Let's remember that forests globally suck up 2-point-4 Gt of carbon each year according to science.org. That's roughly 16 percent of annual global GHG emissions, which have now reached 54 Gt of CO₂ equivalent. Don't forget, you need to multiply tonnes of carbon by 3.6 to get tonnes of CO₂.

[Siri] Not enough to get us to net zero alone but a massive contributor indeed.

Last year at the UN biodiversity Conference (COP 15), governments from around the world decided to adopt the Kunming-Montreal Global Biodiversity Framework. It includes concrete measures to halt and reverse nature loss, including putting 30 percent of the planet and 30 percent of degraded ecosystems under protection by 2030.

This is a landmark accord and significant step in the right direction.

[Siri] But wait. What about the carbon that is still trapped in fossil fuels? the grey carbon?

Excellent question Siri. The answer, according to UV.org, is around 5000 GtC ! Now, the better question is where do fossil fuels come from ?

[Siri] Underground of course!

Yes. But do you remember the mass extinctions events we discussed earlier? Fossil fuels are formed from the remains of these ancient plants and animals that died long ago. After millions of years under intense heat and immense pressure underground, they turned into oil, coal, and gas. They are stocks of ancient renewable sun energy. Or put differently, they are the remains of ANCIENT BIODIVERSITY.

[Siri] Noooo.... This is as shocking as the scene in Star Wars Episode V - The Empire strikes Back where Darth Vader says to Luke Skywalker "No, I am your father"

Well, technically speaking fossil fuels are the remains of the ancestors of today's biodiversity. They're the four fathers.

Now let's look further into the interaction between climate change and energy transition.

I've listened to a fascinating Ted Talk called "The blind spot of the green energy transition". The speaker, environmental expert Olivia Lazard states that decarbonising our economy means decoupling economic growth from greenhouse gas emissions. I.e. Green growth. But to get there, we are recoupling economic growth with intensive mineral extractions. And to harness renewable energy, via solar panels, wind farms, plus battery storage for EVs, we need to mine huge quantities of non-renewable materials as discussed in our Mobility with impact episode. However, because of the low density of minerals in rocks, we need to dig, and dig, and dig even more into large quantities of earth deep into the environment for key minerals such as lithium, copper, cobalt and so on.

But where is the supply? Lithium is found in Chile and Australia, Cobalt, in the Democratic republic of Congo, Nickel in Indonesia, and the Philippines. China is dominating all the processing and has abundant reserves of rare earths.

But these minerals are also in places with the following characteristics: countries that rank high on the corruption indices, affected by conflicts, climate vulnerable and more importantly, with big ecosystems that need to be protected to stabilise the climate and protect earth's biodiversity. These countries are in Latin America (the Amazon), equatorial Africa and southeast Asia.

Changing and eliminating this ecosystem through mining causing deforestation will undermine planetary security, not just international security. It's a perfect storm.

[Siri] Wow, this is where we should say, Houston, we have a problem?

Well, according to Olivia Lazard, we need to use science to determine mining licenses. We also need to Integrate socio economic and ecological regeneration within our business models. There needs to be a global public good regime and resources should be managed globally. Otherwise, we risk conflict and global competition and scramble for minerals. We should also invest in conflict resolution and fight against corruption. Finally, we need to reduce our need for energy and invest in the circular economy, invest in ecological assessment of global supply chains with data on carbon and biodiversity.

In a nutshell, Olivia defines this as ecological diplomacy.

OLIVIA LAZARD: In our little corner of the world, my team and I have working really hard to identify what regenerative foreign policy looks like and what it aims for. There are two things that we know by now. One is very obvious, we need to tackle fundamental issues around economic distribution on a global scale. The other things are that we need a geopolitical de-escalation around decarbonisation and regeneration. We've translated that into a concept we call "ecological diplomacy" and we're pushing really hard for the European Union to adapt this framework within their foreign policy, because if there is one thing that we've understood, is that ecological integrity, is the foundation for all types of security.

Ok, this makes me want to find more innovative solutions and see how one can not only protect biodiversity but also restore it.

Another Ted Talk called "Global movement to restore Nature's biodiversity" by Thomas Crowther brings some great insights on how to repair biodiversity.

Thomas' company, Crowther Lab, collected data from 1-point-2 million forests to build new machine learning models to predict forest structures. There are 3 trillion trees on earth, half the amount a few thousand years ago. Based on their modelling, there is room for 1 trillion additional trees. If we can protect these areas, the soil and vegetation, one could capture 30 percent of excess carbon in the atmosphere. To advance this initiative, organisations like the World Economic Forum launched a 1 trillion tree campaign with governments around the world pledging commitments to the restoration of forests.

However, to quote American actor Gary Busey "if you take shortcuts, you get cut short". There was a big mistake in the communication and execution of these projects. Restoration is NOT enough. It is only one of a portfolio of many solutions needed.

[Sound of trees] This is the sound of an Eucalyptus plantation...There are no sounds of birds or insects.

[Siri] You are right.

It's not an ecosystem. There is no biodiversity. It's a monoculture of one single tree species planted for rapid tree growth. The local community has lost its biodiversity and the benefits of what these ecosystems provided: clean water, soil fertility and more urgently, protection from intense fires that threaten every summer.

[Sound of trees] Let's listen again, but this time an audio recording from The Blue Forest in Halle, Belgium. Here you can hear the beautiful sounds of birds chirping and if you listen more closely, the leaves dancing in the wind. [Kokou inhales and exhales] I could get used to this!

According to an UN report, 50 percent of reforested areas around the world are monocultures planted for rapid carbon capture or timber production. They offset emissions without considering the local ecology, which is not sustainable longer term. There is a big risk of restoration done wrong. Every good idea only works if done right.

In response, Thomas created “Restor” [R-E- S-T-O-R] an open data platform, through a collaboration with Google and the scientific community. Restor provides the restoration movement with free ecological insights and lessons learned from trial and error and information on biodiverse project financing. Restor not only provides info about trees but also land and soil protection while protecting the Interdependence networks of species.

So, we explored the development of biodiversity, the interaction between climate change and energy transition and finally, how to repair biodiversity.

Let’s now discuss how we can track and measure biodiversity to preserve the environment and fight climate change with Matthieu Maurin, co-founder and CEO of Iceberg Data Lab, a database focused on assessing the biodiversity footprint of businesses.

I will conclude this episode not with a quote but with the lyrics of one of my favourite songs: *What a wonderful world* by Louis Armstrong. It is, in my opinion, a touching and powerful tribute to our planet, its biodiversity and our duty to protect it.

[Song] What a wonderful world by Louis Armstrong.

I see trees of green / Red roses too

I see them bloom / For me and you

And I think to myself What a wonderful world

Thank you for listening to this episode of 2050 Investors and thanks to Matthieu Maurin for his valuable insights.

I hope this episode has helped you get a better sense of the future of biodiversity. You can find the show on your regular streaming apps. Please subscribe, leave comments and stars anywhere you like and spread the word!

See you at the next episode!