THE NAUTILUS CHRONICLES: EXPLORING THE FUTURE OF OCEANS

Hosted by Kokou Agbo-Bloua
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EPISODE 28 – featuring with Nisha Bakker, Head of Partnerships at The Ocean Cleanup

What has no beginning, end, or middle and touches every continent?

If you answered, "the ocean"- Correct! Jules Verne even called it the 'Living infinite' in Twenty Thousand Leagues under the Sea. This latest episode of 2050 Investors is a splashy one as host Kokou Agbo-Bloua dives deep into the mysteries of the oceans aboard the modern-day Nautilus, the Nautile.

In 2022, at the UN Convention on Biological Diversity (CBD), 150 member states pledged to preserve or safeguard thirty percent of the world's oceans by 2030: or "30 by 30". While a positive step in the right direction, more still needs to be done.

Join Kokou in this daring adventure exploring the importance of the ocean in shaping Earth's climate, providing food and habitat for animals and humans alike, the economy and so much more!

But be aware as the adventure does take a dark turn when we encounter the deep-water alter ego of the Great Pacific Garbage patch. We will learn about the devastating effects of plastic pollution, envisioning a Kraken monster born from our own waste.

Later in the episode, we speak with Nisha Bakker, Head of Partnerships at The Ocean Cleanup. The Ocean Cleanup is a non-profit foundation working daily to rid the world's oceans of plastic. The organisation has already made progress in cleaning up the great Pacific garbage patch, capturing 2% of it using a specially designed system.
Nisha emphasises the need for a global effort to change the system of plastic production and waste management, mentioning the development of a Plastic Treaty. However, she's optimistic of growing awareness and progress in ocean and river cleaning initiatives.

As the journey concludes, Kokou reflects on the resilience depicted in Hemingway's "The Old Man and the Sea," leaving listeners with a poignant reminder that, despite the challenges, we can persevere.

2050 INVESTORS – EPISODE 28 SCRIPT

The Nautilus Chronicles : Exploring The Future of Oceans (featuring Nisha Bakker)

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 28)

"The sea is everything. It covers seven tenths of the terrestrial globe. Its breath is pure and healthy. It is an immense desert, where man is never lonely, for he feels life stirring on all sides. The sea is only the embodiment of a supernatural and wonderful existence. It is nothing but love and emotion; it is the Living Infinite."

Siri: What are you reading?

Kokou: I'm reading Jules Verne's 1870 science fiction classic "Twenty Thousand Leagues under the Sea". It is one of the best books ever written about the Oceans. You know the story of the three men who set sail in search of a giant sea monster but were instead captured by Captain Nemo

aboard the world's first submarine, The Nautilus. Together, they embark on an epic undersea journey, encountering amazing deep-sea creatures, and even discovering the lost city of Atlantis.

Siri: Ok ok, I know where this is going. But before embarking on a deep-sea investigation of the Oceans and trying to "find Nemo", pun intended, I think you should watch Waterworld instead. Do I need to remind you of the melting icebergs?

Kokou: Ha! This is a chilling thought but a fair one, Siri. It's high time we dive deep into the oceans' mysteries.

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 this episode of 2050 Investors, we investigate the future of the Oceans, the Living Infinite.

What role do they play in regulating our climate? How is global warming affecting the Oceans? How can we protect our oceans in the fight against climate change? And finally, will our planet resemble Waterworld after the polar ice caps have melted and the sea level has risen hundreds of meters? Later in this episode, we discuss practical solutions to address plastic pollution of our oceans with Nisha Bakker, Director of Partnerships at The Ocean Cleanup.

Let's start our investigation.

In Ancient Greek mythology, Poseidon became Lord of the Sea after he and his two brothers, Zeus and Hades, defeated their father Cronos and divided his kingdom up amongst themselves. Poseidon is the personification of the unpredictable nature of the sea, which is described as angry or enraged if it is stormy, and calm when the weather is clear. The ocean was also the realm of monsters too, as such Poseidon was also the protector of sailors and anyone who worked or travelled at sea.

Siri: A moody god for a moody sea. But today, we understand the ocean's moods through science, not just myths.

Kokou: Indeed, the sea is turbulent as it is complex. An interesting article from the US National Oceanic and Atmospheric Administration shares some further insights. Waves are usually caused by wind. Wind-driven waves, or surface waves, are created by the friction between wind and surface water. The gravitational pull of the sun and moon on the earth also causes waves. These waves are tides or, in other words, tidal waves.

Siri: So, we have the moon to thank for our surfing waves and the occasional flooded beach.

Kokou: That's right, Siri. The moon and the ocean are dance partners in this cosmic ballet – One playing the lead and the other, the follow. Each playing an important and intricate role in keeping the balance. Now let's deep dive, pun intended, into the impact of the ocean on earth's climate.

But before that, we must become aquanauts - "astronauts of the sea" - if we are to explore this vast body of water, 80% of which is unmapped, unexplored and unobserved.

Siri: Hum… aquanauts like Captain Nemo and his submarine the Nautilus from the Jules Verne book you were reading earlier?

Kokou: Spot on, Siri! I wonder what a real and modern version of the Nautilus would look like today?

Siri: Let me do a quick search… Your best bet would be the Nautile, the first submersible to explore the Titanic's wreck undersea, back in 1987!

Kokou: Perfect. I think deep-sea exploration is a must for this investigation. We need to get on board the Nautile ASAP.

Siri: OK, roger that Sir! The Nautile is currently in Brest, in France, moored alongside its mothership L'Atalante. I've just booked us two Eurostar train tickets leaving in a few hours from St Pancras station and a rental car from Gare du Nord to get there. Let's go!

Kokou: That was fast. Ok, quick check: passport, wallet, keys, coat…Let's set the alarm and boldly explore where no man has ever gone before.

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Dear listeners, we have just arrived in Brittany, a place close to my heart where I've spent a lot of time. Feels good to be back!

I'm standing on the port, in front of the Atalante. Look, there's the captain waving at us, I think we can board Siri!

Siri: Did you bring my waterproof case? I don't want my semiconductors to rust because of sea water…

Kokou: Don't worry, we'll both be safe.

Ah! There's our vessel. We are now literally stepping into the realm of James Cameron's imagination - aboard the Nautile submarine. And off we go, beginning our descent… We're slowly going deeper into the waters of the Atlantic ocean!

Kokou: (amazed) Over there, the wide glass panels, offering a view of the ocean's depths. It's like a window into another world - colourful corals, curious fishes, a group of octopuses, sharks, the dance of light in the water… Can you hear the clicks and whistles of this group of dolphins?

Siri: Kokou, should I remind you that we're here to investigate, and not to get lost in Jules Verne's oceanic reveries.

Kokou: Haha! fair point, Siri. One can't help but be mesmerized. But alright, back to work…

Ok, so let's start with this article from the London School of Economics, entitled "What role do the oceans play in regulating the climate and supporting life on Earth?".

It states that "the world' s oceans cover most of the Earth's surface, representing about 95% of the planet's biosphere. Thanks to our oceans, approximately 90% of extra heat is absorbed from over a quarter of human-produced carbon dioxide (CO_2) emissions, aiding in regulating the climate."

Oceans are also an important source of animal protein for billions of people in what is known as the “Blue Economy”. And they provide a crucial wildlife habitat, with marine biodiversity outnumbering that of the land.

Siri: Earth should be renamed, Planet of the Oceans.

Kokou: I couldn't agree more. The oceans are a major component of the climate system. They have played the principal role in the climatic balance that the planet has experienced over the last few thousand years. Their role in regulating climate involves taking up heat and redistributing it across the globe, increasing atmospheric humidity, taking up and storing large quantities of CO_2 from the atmosphere.

The ocean is crucial in controlling atmospheric temperatures: without the ocean and its diversity of service provision, Earth’s maximum temperature would exceed 100°C, and the average surface temperature, which is currently around 15°C, would instead be around 50°C.

By the way, did you know that the oceans are by far the largest active carbon reservoir on the planet?

Siri: Really? I thought forests were the biggest store of carbon.

Kokou: Nope, oceans store about 38,000 billion tonnes of carbon! This is also known as “Blue carbon”. Different from the “Green carbon” stored in forests and “Grey carbon” stored in fossil fuels. By comparison, this is over 28 times more than the quantity of carbon stored by land vegetation and the atmosphere combined. Most of this carbon is stored at deep ocean levels via two distinctive routes:

- The first route, and main one, is called Solubility carbon pump: CO_2, in colder high latitude waters, is dissolved. Because these cold waters are heavier than the warm waters coming from the tropics, they sink, bringing this dissolved CO_2 down into the deep ocean.

- The second route is called the Biological carbon pump. It is much more complex, involving a range of biological, chemical, physical and geological factors. It can be roughly summarised as follows: microscopic plants called phytoplankton reproduce on the ocean’s sunlit surface waters, converting dissolved CO_2 into around 50 billion net tonnes of organic matter every year, while producing oxygen as a by-product. When these micro-plants die, they undergo a series of biogeochemical processes that transform the plants into organic matter compounds, which start to sink from the surface.

Siri: This sounds as complex as forest ecosystems but at a massive scale.

Kokou: Well, the emergence of the oceans over 4 billion years ago transformed how CO_2 is distributed over the Earth’s surface. As the oceans dissolved and stored CO_2, the gas went from being a major component of the Earth’s atmosphere to a trace gas, representing 0.04% today. By

changing the atmosphere's composition and climate, carbon, in turn, became abundant in the ocean, enabling the production of new micro-plants via photosynthesis and starting the biological pump. This further enhanced the oceans' carbon storage. In fact, the biological pump is estimated to have further lowered atmospheric CO2 concentration by more than 50% of what it would have been otherwise.

Siri: So, the ocean made life possible at the surface of the planet.

Kokou: Absolutely. And since the Industrial Revolution, the oceans alone have stored an estimated 26% of man made, or anthropogenic, CO2 emissions using physical and biogeochemical mechanisms. Carbon transformation via biogeochemistry has also transformed the oceans into a vital source of at least half of the oxygen in the atmosphere, which enables terrestrial life to thrive. As such, the ocean can be considered the lungs of planet Earth.

Siri: So as important if not more than the Amazon forests!

Kokou: Yes! According to the National Library of Medicine on biotechnology, phytoplanktons absorb approximately 40% of the total CO2 emissions, a quantity four times greater than that absorbed by the Amazon rainforest. Phytoplanktons also produce at least 50% of the Earth's oxygen, making it a crucial contributor to the planet's oxygen supply.

Look, Siri. As we navigate through the deep blue, we see the intricate dance of ocean currents, vast and powerful, steering the Earth's climate. These currents are like natural conveyor belts, distributing heat and regulating temperatures.

Siri: Look at all these corals, and glowing jellyfish… These creatures are the unsung heroes of carbon capture. Without them, we'd be in even hotter water, literally.

Kokou: Absolutely, Siri. Oh, look! There's a whale on our right! I've never seen one from this close, simply mesmerizing… Did you know that these mammals are not only among the biggest on Earth, but are also gigantic biological "carbon capture and storage animals"? I recently came across an article from the BBC entitled "How whales help cool the Earth" and I quote: "When whales die, they sink to the ocean floor – and all the carbon that is stored in their enormous bodies is transferred from surface waters to the deep sea, where it remains for centuries or more. (...) Scientists found that before industrial whaling, populations of whales would have sunk between 190,000 to 1.9 million tonnes of carbon per year to the bottom of the ocean – that's the equivalent of taking between 40,000 and 410,000 cars off the road each year. But when the carcass is prevented from sinking to the seabed – instead, the whale is killed and processed – that carbon is released into the atmosphere."

Siri: Whaling seems to be an environmental tragedy that needs to stop.

Kokou: I couldn't agree more.

Siri: Euh… Kokou, I think our sonar is detecting a very large creature. Look!, there… Do you see what I'm seeing?

Kokou: What... what the hell is this? It's enormous! That can't be the Loch Ness monster, it must be the… the… Kraken!! We need to get out of here, now!…

Siri: Hold on a second! These are not tentacles; the sonar signature is not that of a life form…

Kokou: You're right. This is a large body of… entangled fishnets with plastic materials of all kinds, bottle caps, straws! We have created a new deep-sea monster.

Siri: So, the Great Pacific Garbage patch, which is 3 times the size of France, discussed in the Life in Plastic episode, was only the tip of the "plastic garbage iceberg".

Kokou: This is both terrifying and depressing. It does remind me of Victor Vescovo, pretty much the Christopher Columbus of our generation.

Siri: Really, why?

Kokou: Well… He is an American private equity investor, retired naval officer and undersea explorer who achieved the Explorers Grand Slam by reaching the North and South Poles by climbing the Seven Summits. He then later visited the deepest points of all of Earth's five oceans during the Five Deeps Expedition in 2019. And guess what he found at the deepest point on Earth known as the Challenger Deep, 11,000 km below ground?

Siri: Atlantis? Nemo the fish?

Kokou: No… he found a plastic bag and candy wrappers!

Siri: Unbelievable… Bravo plastic has now officially been where no man has ever gone before. This is a lot to process… I think I'm running low on battery. I think it's time we go back to the surface. I'm about to get sick. I'm a celebrity… get… get… me out of heeeerrrre…

Kokou : Hey Siri, can you hear me ?? Siri?

Here you go. You should be charged now.

Siri: What happened? We were on the Nautile and then everything went blank.

Kokou: Yes, Sorry I should have brought a battery pack. Our Captain Nemo 2.0 was kind enough to bring us back to the surface. We're back on land.

Siri: Phew… What now?

Kokou: We now need to investigate how human induced global warming is destroying the Oceanic systems. The mighty and powerful living infinite is not invincible.

An article from NASA called "Ocean Warming", explains that higher temperatures: thermal expansion, coral bleaching, and acidification were causing biodiversity loss. Moreover, one needs to add overfishing, the destruction of coastal habitat, coral reefs and mangroves to the already overwhelming list.

Siri: It seems the ocean is getting a taste of human-induced heartburn with all this acidification.

Kokou: It's a grim picture, Siri. The changes in ocean chemistry not only affect marine life but also the millions of people who rely on the ocean for food, income, and even their homes.

Siri: Humans sure have a knack for rocking the boat they're in.

Kokou: It's not just an ecological disaster. It's also a social and economic one, affecting livelihoods and cultures. The ocean might not be able to absorb more CO2 in the future and could even start releasing it instead.

An article from National Geographic entitled "Sea levels are rising at an extraordinary pace" gives us the full picture: "Higher sea levels are coinciding with more dangerous hurricanes and typhoons that move more slowly and drop more rain, contributing to more powerful storm surges that can strip away everything in their path. One study found that between 1963 and 2012, almost half of all deaths from Atlantic hurricanes were caused by storm surges."

Siri: Waterworld can indeed be a reality in a few centuries. So, I get the picture, but can we talk about solutions now, please?

Kokou: Sure! Ocean conservation is unsurprisingly a key priority. It is the UN's Sustainable Development Goal n°14: Conserve and Sustainably use the oceans, seas and marine resources for sustainable development. The World Bank has also produced a report called "Blue Economy development framework" to align economic incentives alongside protecting the Oceans.

It covers four types of activities:

● First, harvesting the living resources such as seafood, marine biotechnology.

● Second, the extraction of non-living resources, minerals, energy, fresh water

● Third, the commerce and trade in and around the oceans

● And finally 4th, response to ocean health challenges, coastal protection and waste disposal.

Siri: There is a lot to do.

Indeed, one of the best ways to understand what can be done, is not to treat the Ocean as yet another victim but as a powerful ally in our fight against climate change given its universal role on our planet. A Ted Talk episode called "The Ocean's ingenious climate solutions" by Ocean expert Susan Ruffo had some interesting takeaways:

- First, saving the oceans is perceived as something else we must do :

- "When we think about climate action and climate strategies and climate plans, we often overlook the ocean and leave it out, because somehow we think that saving the ocean is something else we have to do and not a core part of our climate strategy. And that's what has to change. Because the ocean is a core part of our climate system and so it has to be a core part of our climate solutions." (source : Susan Ruffo, The Ocean's Ingenious Climate Solutions, TED Countdown)

- Second, oceans are not climate victims but climate heroes as they've protected us from ourselves by absorbing 90% of the excess warming since the Industrial Revolution. This protection comes at a cost.

So we need to protect mangroves, seagrass simply because they are the most effective carbon sink on the planet and can absorb ten times more carbon than a forest on land.

Now for further insights on solutions, let's discuss one of the most important challenges faced by the Oceans: Plastic pollution and its disastrous effects on marine life. Who else can we talk to, but the Director of Partnerships from The Ocean Cleanup, Nisha Bakker.

[INTERVIEW]

Kokou Agbo-Bloua : Hello, Nisha. Thank you so much for joining our show.

Nisha Bakker : Hello, Kokou. Thank you for having me on your show. We're excited to tell you more about the Ocean Cleanup.

Kokou Agbo-Bloua : So, can you first share with us the mission statement and key priorities of the Ocean Cleanup Company?

Nisha Bakker : We, at the Ocean Cleanup, have the mission to rid the world's oceans of plastic by 2040. And we do that with two things: One is cleaning up the legacy plastic that is already floating in the ocean in different garbage patches. And second, it is trying to close the tap through the so-called arteries, which are the rivers around the globe that are actually emitting plastic into the ocean. It's the largest cleanup in history, so we're excited to try and pull it off.

Kokou Agbo-Bloua : We also came across the Great Pacific Garbage Patch, some research saying that it is three times the size of France. So, do you think you'll be one day able to clean it up by 2040?

Nisha Bakker : Yes, otherwise I wouldn't be sitting here. We've already started cleaning it up. The challenge, this was our programme when we started ten years ago, like identifying what are the big patches where all the plastic accumulates, and then move it forward from there. So, what we did is design a system that we call ourselves the world worst fishing net. So, the fish can go under it, the fish can go through, but the plastic gets caught by the currents and the waves. And then we have missions. We sail out on a six-week mission. It's a week to get there. It's three to four weeks of catching plastics and then bringing it back. So far, we've managed to clean up 2% of the Great Pacific Garbage patch. It's a tiny bit, but this is quite promising for us because this cleanup that we've done up to now was only in the validation phase and only as our way of testing and making sure that we were able to pull it off. And the phase we're currently in is actually enlarging the system. So, all the testing we did so far was with a system and a net, a capturing device of 800 metres bandwidth, and we've now increased the span width to 2.1 kilometres.

Kokou Agbo-Bloua : Brilliant. That's really impressive and inspiring. We've done an episode on plastic, and we've also seen that only 10% of all plastics were getting recycled. And the question

we typically have when it comes to cleaning up the ocean: is do you feel that we are only addressing the symptoms and not the causes of ocean pollution? Therefore, our society's obsession with excess consumerism and the plastic-based economies. And the second related question would be what needs to change, in your opinion, as a priority to really preserve our oceans as a result?

Nisha Bakker : Yes, this is the most valid question that we should all have indeed. Like, are we mopping the floor while keeping the tap open or are we really doing something to change the system? In the end, this problem will only be solved if we change the system. And this system is about plastic production in the first place. But most more important also, it's the waste management. If there are countries that don't have a proper waste management system in place, it doesn't matter what you do, but it will eventually always end up in landfills, in garbage patches, in rivers and eventually in the oceans. So, while we're focusing on cleaning up oceans and rivers, we do try to make sure that we're part of this bigger system change. And I think one of the most exciting developments of the past couple of years is that there is a globally binding legal instrument being developed through the Plastics Treaty. The most recent session took place early November in Nairobi, where the world basically is coming together to discuss how the world is going to take action towards the legacy plastic, towards recycling, towards the pains of plastic production in the first place and developing actions to tackle this from a systems' change perspective.

The treaty hopefully will be signed by the end of next year, early 2025, and I think that will be the push where everything comes together in an ecosystem and hopefully that's also the tipping point where there will be a legal push to change this.

Kokou Agbo-Bloua : But looking at the future, how do you see the future of oceans? Do you think we will be able to preserve it and protect marine biodiversity by 2050? Or will the oceans essentially take over the Earth, like in the movie Waterworld?

Nisha Bakker : That would be a very depressing scenario if that would happen, to be honest. On the one hand, I'm worried. I am worried because the oceans are our biggest CO2 capturing device on the globe and there is no alternative. Like, this is it, and we're messing in a way with it that hasn't even been researched. We don't know what the effects of microplastics are that are spread out evenly through the oceans. We don't know what happens if we don't clean up the patch and leave it until it dissolves into micro nanoplastics. And we don't have the time to wait for the answers that come in from research. It's also the time to act now. But the reason why I'm worried is while we're acting, we also know that plastic production is actually going to triple by 2050. There is no sign that plastic is going to stop being produced or that our behaviour is going to change significantly. So, what I'm hoping, and what we're trying to push for, is really the systems change, behaviour change, but this really needs an entire ecosystem to work together and that can go very fast once there is a tipping point.

Kokou Agbo-Bloua : I think it's fascinating what you've managed to accomplish. And thanks so much for joining the show.

Nisha Bakker : Yes, well, thank you for joining us on this journey and having me on the show once again.

To conclude this episode, I will quote a sentence from Ernest Hemingway's novel "The old man and the Sea".

"But man is not made for defeat" he said. "A man can be destroyed but not defeated".

This quote best captures the human condition, reflecting on determination and the enduring struggle against overwhelming odds.

Any last words, Siri?

Siri: Well, I think we all live in a yellow submarine… so we'd better not sink it.

Kokou: Very true, ha… (singing) "We all live in a yellow submarine, a yellow submarine, a yellow submarine." …

Thank you for listening to this episode of 2050 Investors and thanks to Nisha Bakker for her valuable contribution.

I hope this episode has helped you get a better sense of the future of the oceans and the challenges that lay ahead. You can find the show on your regular streaming apps. If you enjoyed the show, help us spread the word! Please take a minute to subscribe, review and rate it on Spotify or Apple Podcasts.

See you at the next episode!

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