

Sustainability I: The World's Oldest Innovator

Delphine was a girl born in 2099. One day, her gran gave her a book, heavy with a spine. There were photographs of creatures she'd never, ever seen. What are they gran, these animals? What does this all mean? Gran sighed. Many years ago, they roamed the earth and seas - but we bulldozed their homes, and burnt down their trees.

We put plastic in the oceans and greenhouse gases in the sky, but why did you let them gran? Why, oh why, oh why? I was just a child, she said, I shouted no one took heed...

NOON SALIH: On Earth Day 2021, a competition was launched across the UK to bring young people's voices to COP26 - The UN Climate Change Conference of the Parties, which took place last month in Glasgow. Children were asked to tell a story that would send a powerful message to policymakers - that our world is special, that our world needs us, that we need to do everything in our power to protect our planet. What you just heard was part of the winning story - written by an 8-year old girl named Delphine. It was screened at the opening ceremony of COP26 in front of world leaders, a reminder of what's at stake for the nearly 8 billion human beings on this planet if they - we - do not immediately enact sustainable change.

Now, "Sustainability" is one of those words that gets thrown around a lot when talking about how we can secure a better future for all, but what does it really mean?

JOHN BULL: It's about how we manage our use of our finite resources to lead to a future in which both ourselves and the rest of the planet thrive, how we sensibly and joyously manage the use of them to create a future that is one that we can be proud of, of one that we know we're gonna thrive in. And one that we know we're going to continue to grow in, but that's not at the expense of this life-sustaining resource that we're sitting on. It's in partnership with that.

NOON SALIH: This is John Bull, Director of Terra, the Sustainability Pavilion at Expo 2020 Dubai. Terra - which is Latin for "Earth" - stands as a monument to one of this Expo's subthemes and its overarching goal: to become the most sustainable Expo yet. It's a physical manifestation of a promise, almost - that, together, we can and will change the fate of humankind.

JOHN BULL: There's no question about whether we've solved the situation that we're in at the moment or not. We haven't solved it. Yet we have the potential to do that. And then, you know, that's the great thing about the lens of seeing the world that Expo brings. It's always attempting to be hopeful. It's always attempting to see the best in humanity and, you know, the enormity of the challenges that we're facing can only be kind of matched and equaled by the enormity of the ingenuity and abilities of humanity to come up with new ideas, to take us forward. And we're seeing those all over the place.

In this two-part series, we look at how Expo 2020 Dubai has internalized the gravity of our current environmental crises, committing itself to leading the way for sustainability and stewardship. How is it drawing inspiration from the world's oldest innovator - nature - to present effective solutions for our most pressing problems?

I'm Noon Salih, and this is Inside Expo, an official podcast of Expo 2020 Dubai, where history is being made.

[INTRO STING]

NOON SALIH: If you get the chance to fly over the Expo 2020 Dubai site, you'll notice that the grounds are laid out in a peculiar manner. You'll see three petal-shaped districts surrounding Al Wasl Plaza, with the iconic Dome at the heart of the Expo. Each of these petals represents one of the sub-themes of this year's Expo: mobility, opportunity, and sustainability. And each of these petals is anchored by a thematic pavilion: Alif, the mobility pavilion. Mission Possible, the opportunity pavilion. And Terra, the sustainability pavilion.

Sounds fun, right? It's this kind of intentional design that helps Expo touch the hearts of its visitors. That applies to both the macro - like the site's layout - and the micro - like the thematic pavilions. And in a place like Terra where you can feel the heavy weight of our environmental crises, intentional design becomes a tool for inspiration and positivity.

JOHN BULL: We didn't want to do a few things. So firstly, with sustainability, one, it can be boring. Two, it can be a very judgemental topic to talk about. And three it's one that can lead to kind of being a bit of a know-it-all. And we wanted to. All of those things, because nothing could possibly switch our audiences off any faster than that.

And let's be honest, the science behind the global situation in terms of our relationship with the environment and the struggles that it faces is well-known.

What we have to do is take that science and connect it better to people. We need to touch people's hearts as much as we need to touch their heads. We want to show people that they're part of a story, they're part of the solution.

NOON SALIH: Terra takes its visitors on an emotional journey as they travel through immersive environments that encourage them to consider their relationship with nature. And who better to take you on this journey than John himself and Phillip Dunn, Senior Manager for Exhibitions and Pavilions at Expo 2020 Dubai, or Phil as he likes to be called.

PHILLIP DUNN: Terra is an architectural marvel. So when you first encounter Terra, I think it's very awe-inspiring.

JOHN BULL: It's almost as much of a sculpture as it is a piece of architecture. It rises out of the desert because it's sunk down into it. And your main feature that you see is this huge canopy made of recycled steel. It's 130 meters from left to right covered in photovoltaics, of course, solar panels to capture the abundant resource that we have here in Dubai, the sun, and send it down into the building for use with this canopy cantilevered over the rest of the building seems to hover there almost like a spaceship or a mushroom, or actually like the, like the Dragon Blood Tree from Socotra.

NOON SALIH: This canopy covers 6,000 square meters and provides shade for Terra's massive grounds. And, here's a reference point for how wide it is - according to Phillip, 130 meters are equivalent to almost five blue whales stacked end to end. Let's go back to our journey through Terra with Phil...

PHILLIP DUNN: And then you enter through a journey of about 7 million years where you walk through a Wadi and it takes you down into the exhibition space of Terra, where you get to choose to either go under the ocean or under the forest.

As they walk through those exhibits, they're also confronted with what humanity is doing to nature.

So there are exhibits there that talk about our consumptive lifestyles and our human impacts in the Anthropocene era or the age of humans, the age of man.

And all of those things are really from what we can tell a very emotional experience for the visitors that are coming through Terra.

They're posed with questions about, would you rather, so would you rather never see an ocean again, or never see a forest again? Would you rather save a hundred small animals or one large animal? They're posed with questions that don't really have a right or wrong answer, but are made to evoke thought and discussion.

They then continue on the journey through a gallery where they're asked to choose three things. If their house was either flooding or if their house was on fire, which three things would you take? And it's really interesting to see which three things people choose. It's very very similar. It doesn't matter where you come from in the world, which culture you're from. We're finding that people are choosing things that are just important to them.

So personal momentos, passports, wallets, pictures of their grandparents, things like that. So we're learning that people have shared common values. And after they're walking through that, they enter into the Lab of Future Values, which is really talking about. Some amazing things that humanity is doing to protect the nature and to bring humanity together.

And then they make their way out of Terra and into the rest of expo 2020. So it's very much a journey that's punctuated with emotion and knowledge and hopefully, at least people wanting to take action and do something to make the planet a better place.

NOON SALIH: Of course, where Terra talks the talk when it comes to visitor experience and design, it also walks the walk in how it functions. Here's John, the director of Terra, once again.

JOHN BULL: I mean, this building's a hard working one. We're pushing it to meet targets, to be net zero and its use of energy and net zero in its use of water through its operations. there's so many innovations here where we've pushed, pushed the envelope and our architects Grimshaw have pushed the envelope to, to trial new things that, that work well in this environment that could be adapted and used elsewhere, whether that's run it using the power of the sun, it's UV to filter our water as we run it around the canopy, whether it's using the landscape and our plants to filter water so we can push it back in whether it's the use of carbon fiber to create the energy trees that rotate to face the sun so that we can grasp every last bit of solar power we can. There's so many features here that are, they're all incredibly intentional and incredibly thoughtful.

Every material choice we've made here has been done; firstly, to minimize the use of that material, secondly, to look whether we can source it locally, whether we can source it from sustainable means, whether we can reduce the footprint of this beautiful building.

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NOON SALIH: Throughout this entire journey, you might have noticed that John and Phil repeatedly make reference to elements of nature - the sun, plants, trees,

canopies, forests, water, oceans, animals. This is, once again, intentional. In its pursuit of being a model of sustainable development and design, Terra draws its inspiration from the world's oldest innovator - nature. There's a scientific term for that actually: Biomimicry.

To tell us more about this approach, we spoke with Sara El-Sayed, a biologist and biomimicry expert.

SARA EL SAYED: So biomimicry is the combination of two parts of a word, bio, meaning life and mimicry, meaning imitation. And so it's simply that it's simply looking at nature and imitating it to create more sustainable design. The idea behind the premise is that the natural world has kind of been doing R and D, research and development, for the past 3.8 billion years, so it's evolving, it's changing, it's adapting to the circumstances.

And so different organisms in the natural world are trying to figure out a way to exist, to live. And so these strategies are very well thought of and researched and practiced strategies that allow these organisms to adapt in these different places. And so the idea behind biomimicry is can we learn from all these different organisms? What can they teach us? How can we better fit onto this planet of ours in a way that's more sustainable?

NOON SALIH: And biomimicry can be found all over the features of Terra. Look no further than the 18 mechanical energy trees, or e-trees, found on the pavilion's grounds. These are inspired by the Dragon's Blood Tree of Socotra.

PHILLIP DUNN: And these trees are very high tech in their construction and in their materials are made out of carbon fiber. And you can see visually that they're very much inspired by the structure of that tree from a structural capability.

And on top of that, what makes these E-trees even more fantastic is that they're covered in bi-facial solar panels so they capture the sun that's directly coming out of the sky. And then they capture the reflect of the sun that's bouncing off the ground as well. And they rotate like a sunflower would do and track the sun 180 degrees during the day.

So much like heliotropism in the sunflower, these track the sun in the sky and maximize the amount of energy that they take from the sunshine.

NOON SALIH: Phil also tells us about Terra's water tree, which is also inspired by the Dragon blood tree in that it survives on very little water, capturing either rainfall and humidity in the air and then funneling it down into Terra's water system.

Terra also seeks to educate its visitors on biomimicry through 6 micro museums that are distributed throughout the public realm of Expo 2020 Dubai. These micro museums were created in collaboration with a bio-inspired consultancy called Biomimicry 3.8, and they highlight 18 different "teachers" found across Arab ecosystems. Both Sara and Phil worked on these micro museums.

PHILLIP DUNN: It is a small kiosk, six of these small kiosks that are spotted through the public realm at Expo, uh, they're solar powered. They're completely autonomous. And each one of them speaks to three animal teachers or three organism teachers. There's some plants in there as well.

So we have them speaking about oceans, grasslands, forests, and desert.

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SARA EL SAYED: In some cases we intentionally chose organisms that maybe people feared just so that we can change the narrative around it. You know? So that's the idea of, let me be your teacher - دعني اعلمك - , so the gecko was one, Pearl oyster, the nurse shark, the mangrove, the camel, spider, hamour fish, the Acacia tree, the Lebanon cedar tree, butterfly, honeybee, Palm tree, ants, falcons, termites, coral reef, the humpback whale.

PHILLIP DUNN: We cover so much ground. There is so much information and lessons packed into these bundles of joy.

NOON SALIH: These interactive kiosks seek to create an interest in biomimicry and natural preservation by playing on visitors' sense of child-like wonder and curiosity.

SARA EL SAYED: One of the big things that we we try to do in teaching biomimicry is, we try to have people reconnect to their younger self, like reconnect to that excited little child, the inner child in you that was asking so many questions, you know, like, how does this work?

How does the ant do that? How does this spider create this, this web? If you really sit down with a little child and allow them to be themselves, they're going to ask you a hundred million questions. And they're always about how these different things actually work. And so in a way, we're trying to touch on that, you know, how can we become reconnected to that inner child that is in awe, that is trying to have these, you know, questions to these different things. And the best teachers are the organisms that are around us. We just need to listen to them and find ways to discover them, let's say..

PHILLIP DUNN: Let's use a shark for instance...so it tells about the shark's skin and how the shark skin is made of these very, very small scales called denticles and the denticles have a certain shape to them that allow water to flow over and create these little vortices behind the flow of the water, and that can speed up the swimming of the shark.

NOON SALIH: Scientists have bio-mimicked one of the main functions of these denticles to reduce fluid resistance, inspiring everything from faster swimsuits to energy-efficient airplanes. In fact, denticle-inspired design on plane wings can reduce air resistance by 10%, which allows planes to travel faster and consume less fuel.

PHILLIP DUNN: So imagine that carbon footprint, that saved, if you multiply that over hundreds of thousands of flights. So there's so much to learn from nature. And that's just one of about 36 lessons that we have in these little micro museums.

NOON SALIH: All of this *barely* scratches the surface of the sustainable innovation on display at Expo 2020 Dubai. But the takeaway is simple - nature has had the answer all along.

JOHN BULL: Nature has been innovating for 3.8 billion years. It's been working hard to adapt, to thrive, to find ingenious solutions that frankly, some of them, when you look at them, blow your mind from natural embedded structural color within the wings of a butterfly, whether it's the circulatory systems of water within a fabulous tree, like the Dragon's Blood tree. Nature has been at this. Nature has come up with ideas, which frankly are just not set within our way of seeing the world.

We have the potential to benefit from this research and development, which can set us ahead by years, if we look back and learn appropriately. There is no

challenge that we face that nature has not already come up with a solution for. We just need to know where to look for it.

SARA EL SAYED: As much as we are learning from it right now, we also need to give it back. We need to allow it to thrive a bit more. And so as we do this kind of work, we also need to think from a conservation perspective, how can we give back? So I really would like to invite people, yes, learn from these strategies. Yes, innovate. But also as you do that, you know, think we are part of this incredible planet, this blue planet that we have, and we need to give back to it in one way or another.

NOON SALIH: Join us in the second episode of this series as we take a deep dive into Expo 2020 Dubai's approach to solar energy, and how it continues to look to nature for effective solutions to the ever-growing environmental issues we face today.

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NOON SALIH: Inside Expo takes you behind the scenes at Expo 2020 Dubai, sharing our stories and others across the 170-year history of this global event. Learn more by visiting [VirtualExpoDubai.com](https://virtualexpodubai.com).

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