



FOREWORD

Yvonne Suter Head of Corporate Sustainability & Responsible Investment, Julius Baer The current pandemic has highlighted how fragile and interdependent our world is. In recent years, nearly every new disease – Covid-19 included – has been the result of human encroachment into wildland. It is becoming increasingly clear that if we do not start prioritising the protection of nature, such global events will happen more frequently and be ever more devastating.

Many people are hoping for a return to 'normal' after this extended period of upheaval and uncertainty. I suggest we should instead be looking to build a better, more sustainable and resilient normal. Preventing further pandemics by protecting wildlife and forests, for example, would cost just 2 per cent of the estimated USD 11.5 trillion damage so far known to have been caused by Covid-19. Moreover, according to the World Economic Forum, actively tackling the global nature crisis could create 400 million jobs and USD 10 trillion in business value each year by 2030. We must take the opportunity to ensure our economic models align with our planetary boundaries and aim for a more stable future.

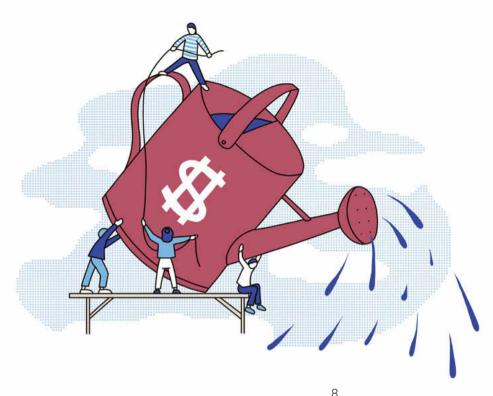
This is, of course, a multifaceted challenge. Many of the most critical issues affecting developed economies are caused by unsustainable production and consumption behaviours. The prevalent overuse of natural capital has led to unhealthy oceans, the vanishing of biodiversity, and climate pollution. This ultimately threatens the ecological limits within which the global population needs to thrive.

At the same time, human resources are not being used to their maximum potential. Societies are becoming more polarised, with increasing wealth disparity fuelling populism across the globe and undermining access to equal opportunities. Despite having some of the fastest-growing economies by GDP and population, developing countries often lack the framework conducive to sustainable growth.

One of the first steps towards tackling these challenges and building a more sustainable 'normal' is to acknowledge and better manage the ecological limits of our planet. It will take a concerted effort across communities, industries, and countries to get us there.

At Julius Baer, we see that our clients are increasingly interested in having a positive impact on the environment and society though their investments. At the core of our role as a wealth manager is the desire to provide them with the right tools and advice so they can make educated choices. This special report looks at addressing the overuse of natural resources, one of the key focuses of Julius Baer's impact investing approach, and shares the experiences, knowledge, and expertise of industry leaders.

We are at a critical juncture when it comes to investing in Planet Earth. We hope these articles inspire you to help build a world that is resilient, prosperous, and with nature-based solutions at its core.



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MAKING AN IMPACT

Monique Baer tells us why the financial industry must embrace the sustainable investing movement by helping investors to understand impact investment and get involved themselves.

Interview by John Franklin



Monique Baer is a fourth-generation member of the Baer family. Although she has no formal ties with Bank Julius Baer, her lifelong commitment to philanthropy and impact investing as a result of her family wealth has given her a desire to inspire others to do more with their money. An engineer agronomist with a background in behavioural research, she has dedicated the past 15 years of her life to philanthropy, financial innovation, and impact investing. She sits on the board of a sustainable investment company and works on a number of different initiatives relating to sustainable investments both in Switzerland and abroad.

Please could you tell us why you became an impact investor?

From a young age, I was very interested in the world around me. This was coupled with the realisation that I was in a special position with which I was not at ease. It made my life rather complicated and as a child I dreamt of being like my friends; I hated to come from a different background. I didn't feel different from my friends, but I struggled and made a big effort not to be seen as a spoiled girl from a wealthy family. My father understood my struggles – he taught me the importance of philanthropy and the responsibility that everybody in a fortunate position has towards society.

When I was young, I didn't understand business, but I understood the importance of responsibility. For many years, responsibility was merely an inner need, a value in my personal life. But I still had to find a way to put my understanding of responsibility into action.

It was only after my 50th birthday that I decided to go even deeper into the subject of philanthropy and then I took my first formal steps into impact investing. I chose this approach over philanthropy, as this helped me to keep the two things apart. I always seek to play a part in the organisations I am involved with, rather than just giving money. For me this is equally important in philanthropy as it is in impact investing.

What can spur the impact investing movement to fulfil its potential?

I believe that the financial industry has the opportunity to be an innovation driver, but at the moment it is not living up to its full potential. I do see chances to embrace the energy of this movement. Many people have the intention to get involved, they want to create more impact with their wealth, but they don't know how to go about it, they are seeking help and guidance to take their first steps. Just investing can be a difficult process, but impact investing – in order to do it properly – requires an even greater understanding. Whether you have large or small sums to invest shouldn't matter, as it all has an impact, but there must be good guidance available for all levels of financial ability.

For people interested in this field, why is now the time to get involved, and how did you find your particular path?

For too long we have ignored the fragility of our environment, and it has become clear that humanity cannot survive unless we make significant changes. We all have a part to play, we all have a responsibility. For my part, improving the impact of all my activities is an ongoing process - from traditional asset allocation to impact investing and philanthropic ventures - but I cannot do this without the support of my team. When I started on this path I was like anyone trying something for the first time. I made mistakes, I had good ideas with great intentions, but I needed guidance so I began to build my team. My long-term advisor joined me first and is there to guide or counsel when necessary. As impact investing became a more important topic for me, the team grew to create a strategy specifically to ensure I focused my actions on creating the greatest impact. Without their invaluable support, I would possibly still be at the stage of just having good ideas and great intentions.

"For too long we have ignored the fragility of our environment, and it has become clear that humanity cannot survive unless we make significant changes." MAKING AN IMPACT

Where should people focus their attention regarding their investments?

People often do not realise the importance of investing in the right companies. Companies with good values make a difference. It matters how we solve the biggest problems of our society and it is crucial for our future that we are aware of our economic actions. There must be greater awareness of the impact that simple decisions can have, and people must be able to make educated decisions about where to focus their attention when investing or spending money.

I have decided to focus my investments on areas that support my values and beliefs. A democratic society needs equity of opportunities, therefore good health, quality education, and gender equality have priority for me. To have a healthy society we need healthy surroundings, so clean energy, climate transition, and ocean rehabilitation are important to me as well. Finally, social and technical innovation are key. It is important to focus on making improvements and reducing harm, but that isn't always so easy; it requires us to leave our comfort zone and to start thinking and acting differently.

What can be done on a broader level to encourage more people to put their values into their money?

On a broader, societal level, I strongly believe that we have to mobilise private wealth to achieve the targets set by the United Nations Sustainable Development Agenda of 2030. If the portfolios of wealth owners begin to advance sustainable development, and the decisions leading to these investments are made to have maximum positive impact, this will be a huge step in the right direction. Today, many investors are ready to focus more on impact investing, but they need good and innovative advisors to fully understand their needs, and their banks and financial partners to support them. Not all banks and advisors are ready for that change yet.

I am particularly inspired by how young people are interested in, and aware of, the impact investing movement. They want to put their values into their money. I am also inspired by the power of women. I believe they can transform the impact investing space, and there are many wealthy women who would like to create more impact with their capital,

but, like male investors, they want to be heard and understood. Advisors have to listen more carefully to what women really want and what their values are. Women, like men, are not simply looking for financial education, they want professional support for their impact goals and needs.

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Is there a danger impact investing can be seen as too 'fashionable' or short-term by investors?

Sustainability and impact investment are very fashionable terms at the moment, and many banks and investment companies are flirting with these ideas. But the topic is serious and deserves – needs – more than just a flirtation. To make a real change you have to be prepared to have a serious relationship with impact investment. This is not only true for investors but also for banks. It takes time, and effort, and sometimes you will need more than trust to keep that relationship on track.

With 15 years' experience in the field, I can say that these actions and investments are rewarding by all definitions, and, in my humble opinion, to follow the sustainability movement will only become more self-feeding as it is not a trend that is likely to disappear any time soon.

What have you learnt through your experience and what advice can you offer to others?

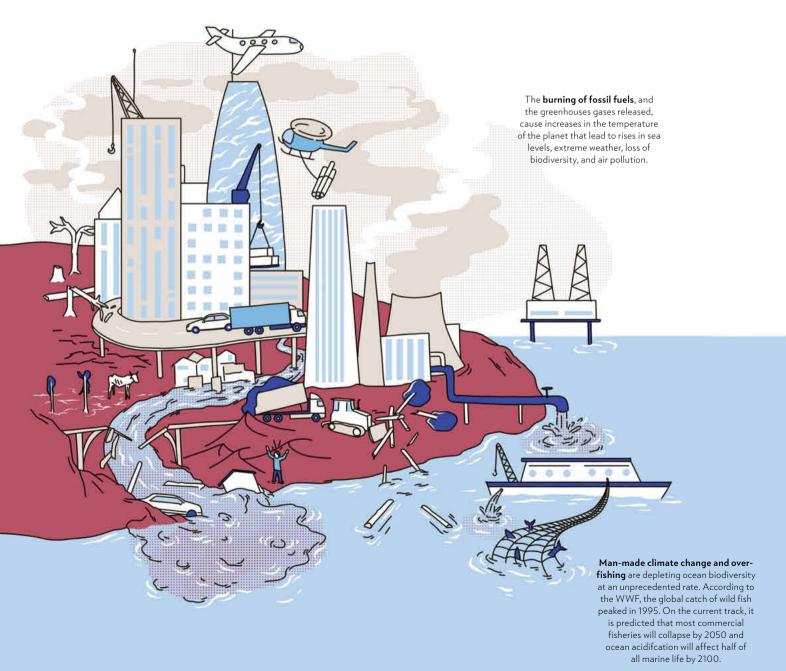
My experience with impact investing has been eye-opening. I have learnt that I have to separate my philanthropic engagements from my investments. Impact investing is about doing business either with the goal of 'impact first', where the revenue is less important, or 'finance first', where you can expect market returns – it is in any case about impact and about making money. It is important to put the two goals on the same level and positive impact is always crucial.

Secondly, I have learnt that profit and impact are not mutually exclusive. Investments always have an impact – the question is, what is the impact, and is that good for us as a society? There is always an impact if you invest – you simply have to decide what you want to achieve with your financial power. I hope that by sharing my experiences I can inspire others to think about the effect that their money can have on our world.



PUTTING NATURE TO WORK

While the threats to humanity's future are varied and serious, there are many ways in which we can use nature to heal the planet, from our everyday home lives to our investment decisions and far more.



Covid-19 has reminded us all that letting the planet continue on its current course is a recipe for disaster. Financial reform must be at the heart of any solution.

By Inger Andersen

There is nothing new in saying that human, economic, and business health depends on nature. Or that we urgently need to reduce human threats to our natural life support system, which provides food, materials, water, energy, climate regulation, and so much more. Scientists and environmentalists have been telling us this for decades, but we did not act hard or fast enough.

Sometimes we need to take a hit before we protect what we value: the heart attack that makes us change our diet, or the cancer scare that makes us stop smoking. Covid-19 is our health scare, on a planetary scale. We need to respond appropriately and immediately, by shifting from destructive economic activities to investing in nature.

The pandemic has drawn a direct line between the health of nature and the health of people and our economies. Many studies have linked the erosion of wild spaces and the unsustainable exploitation of species to diseases such as Covid-19, known as zoonoses, because they jump between people and animals. While zoonoses have been experienced throughout human history, there have never been so many opportunities for pathogens to pass from wild and domestic animals to people.

We have all seen and felt the consequences. More than one million people dead. Livelihoods in ruins. Businesses closing, never to reopen. The biggest global recession since the Great Depression of the 1930s.

THE THREE PLANETARY CRISES

What should worry us even more is that Covid-19 is not a standalone threat. It is part of what we at the United Nations Environment Programme (UNEP) call the three planetary crises: the climate crisis, the biodiversity and nature crisis, and the pollution and waste crisis.

Climate change is bringing forest fires, extreme heatwaves, devastating droughts, and terrifying floods across the globe. Without action, we risk missing the Paris Agreement's ambition of holding global warming to well under 2 °C and limiting further devastation. Humanity has altered three-quarters of the planet's surface and placed the existence of one million species in doubt. We have polluted the air, land, and water – harming human health, food security, and economies.

All this is driven by humanity's relentless, unsustainable consumption of natural resources. Estimates of our total impact on nature suggest that maintaining the world's present living standards with current economic systems would require 1.6 Earths, and that is during a time of economic slowdown.

THE ECONOMIC IMPACTS

What does this mean for economies and businesses, beyond the immediate impact of the pandemic? More than half of global GDP depends on nature to some extent. Our activities are eroding this economic base. The Intergovernmental Platform on Biodiversity and Ecosystem Services in 2018 found that land degradation and biodiversity loss were costing the world 10 per cent of GDP each year in lost ecosystem services, such as preventing harmful nutrient run-off into streams or decreasing the effects of floods.

We can also estimate the value of natural capital – the planet's stock of renewable and non-renewable natural resources – alongside values of produced and human capital, such as roads and skills. Together, these three forms of capital measure a country's true wealth. Data from UNEP show that – per person – our global stock of natural capital has declined nearly 40 per cent since the early 1990s, while produced capital has doubled and human capital has increased by 13 per cent. We need to decouple growth from the erosion of nature.

The World Economic Forum's 2020 Global Risks Report, meanwhile, ranked biodiversity loss and ecosystem collapse as one of the top five threats humanity will face in the next ten years. The financial implications for businesses and investors include reduced commodity yields, disrupted supply chains, and the loss of potential sources of new products such as medicines.

Companies that produce clothing and accessories use natural fibres for production, the supply chain of which can be disrupted by more frequent flooding and storms. The brewing industry is also highly dependent on a natural supply chain, again at risk of disruption from nature loss, climate, or pollution.

FINANCIAL REBOOT

It is clear that we need systemic change to build low-carbon, nature-positive economies. One of the insights from the Dasgupta Review on the economics of biodiversity is that finance plays a role in determining both the stock of natural capital and the extent of human demands on the biosphere.

Part of the change must come through pandemic recovery stimulus packages that align our economies with the Sustainable Development Goals (SDGs), the Paris Agreement on Climate Change and international processes that target healthy biodiversity. Over the next 6–18 months, governments are expected to inject approximately USD 20 trillion into pandemic recovery, on top of money already spent protecting people and jobs. We need to invest much of this in nature-based solutions, sustainable agriculture, renewables, conservation, and green and blue infrastructure.

Such large-scale investments can bring massive returns. Between now and 2030, the restoration of 350 million hectares of degraded terrestrial and aquatic ecosystems could generate USD 9 trillion in ecosystem services and remove up to 26 gigatonnes of greenhouse gases from the atmosphere. The economic benefits are ten times more than the cost of investment, whereas inaction is at least three times more costly than ecosystem restoration.

Overall, the business opportunities from transforming the food, land, and ocean use system could generate USD 3.6 trillion of additional revenues or cost savings by 2030, while creating 191 million new jobs. To take advantage of these cost:benefit ratios, the United Nations Decade on Ecosystem Restoration will, from 2021, marshal the global community to restore degraded land.

CHOICES FOR INVESTORS

Governments, however, cannot do it all alone. We need the entire financial system to reform, and that includes all investors and providers of finance – from those putting in a few hundred dollars to those putting in billions. Financial institutions can contribute in many different ways.

Investors can finance climate action, with renewable energy a well-known and profitable avenue. They can also look to biodiversity, as we need the world, not just environment ministers, to get behind the soon-to-be-agreed global framework to address biodiversity loss. UNEP's Finance Initiative recently released a report calling on the finance industry to set biodiversity targets across their activities to enable them to implement net biodiversity gain, or at least no net loss. Investors can look for biodiversity-positive investment opportunities and progress against targets – be they in agriculture, timber production, tourism, or infrastructure.

The financial sector can consider the impact its holdings have on the marine environment. More than half of the ocean is subject to industrial-scale harvest, while protective and nurturing marine ecosystems like mangroves, coral reefs, and seagrass meadows are being destroyed. Investors can ask themselves if their investments are helping to rebuild ocean prosperity, restore biodiversity, and regenerate ocean health. One initiative of note is the Global Fund for Coral Reefs. Coral reefs provide around USD 2.7 trillion per year in ecosystem service value. The fund, a ten-year USD 500 million blended finance vehicle, aims to head off a situation in which 75 per cent of the world's reefs will be under high threat by 2050.

Consumers and corporates can also choose where to bank, and ensure that their banking partner is committed to responsible banking practices. The UNEP Finance Initiative hosts the Principles for

Responsible Banking, which provide banks with the framework for sustainable decision-making.

'The Economist' recently highlighted that 87 per cent of young investors believe corporate success should be measured by more than financial performance. Many young investors want more than just returns. They want a viable planet that can sustain them and generations to come. The paper puts the investment community on notice to take these young investors seriously.

MORE THAN PHILANTHROPY

Investments in nature are, at their heart, investments in our own prosperity. Diverse ecosystems are more stable, productive, and resilient to change. Just as diversity within a financial portfolio reduces risk to returns, greater biodiversity reduces risks within a portfolio of natural assets. Multiple studies have shown that ESG (environmental, social, and governance) factors can be real drivers of value. Meanwhile, increasing international frameworks and regulations will lead to stranded assets, and polluting industries will become increasingly untenable – a fact that will be reflected in their share price, resilience, and longevity.

If we pursue nature-positive investment opportunities, the earth can regenerate. When we invest in nature, we make a significant contribution to halting the three planetary crises. We accelerate the transition to clean energy sources and sustainable methods of production. We safeguard the future for generations to come, and our businesses, economies, and societies thrive.

Yes, times are currently hard, but now, more than ever, is the moment to invest in a future that will allow people, businesses, and the planet to prosper. The question is not, "How can we afford to invest in nature?" It is, "How can we afford not to?"



Inger Andersen, Under-Secretary-General, United Nations, & Executive Director, United Nations Environment Programme

Inger Andersen has more than 30 years' experience in international development economics, environmental sustainability, strategy, and operations. She has served as Director General of the International Union for Conservation of Nature and held senior positions at the World Bank for 15 years.



Sustainable management of forests

The negative impact of logging on biodiversity means managing forests sustainably is critical. Using harvesting techniques such as improved planning and greater precision, the industry can continue to meet demand in a sustainable and equitable manner.

A WORLD OF OPPORTUNITY

To address the nature crisis, we need to embrace nature-positive models in areas such as food and agriculture, infrastructure, and energy. Here we look at six important global drivers of natural resource efficiency, as identified by the World Economic Forum.

Ecosystem restoration and avoided land and ocean use expansion

The footprint of agriculture, aquaculture, and food production is continually expanding and unsustainable. We must adapt our approach to concentrate on terrestrial and marine ecosystem restoration to protect the nature we rely on. Support is required from both industry and regulation to drive this transition.



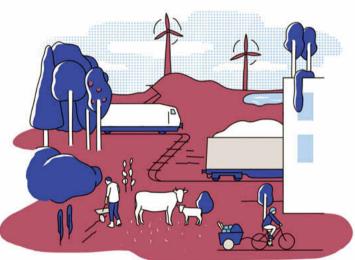


Planet-compatible consumption

To move towards planet-compatible consumption, we must move away from resource-intensive foods and harmful fast fashion that generate significant amounts of commercial waste and greenhouse gas emissions. This path will not only improve our overall health, but will also significantly reduce the destructive impact on our planet.



The integration of transparency, traceability, and collaboration into supply chains will help the transformation of how we produce and consume food, agricultural, and forestry products. Benefits to stakeholders include reduced food and material loss, increased sustainable sourcing, and the ability to make informed, responsible decisions.

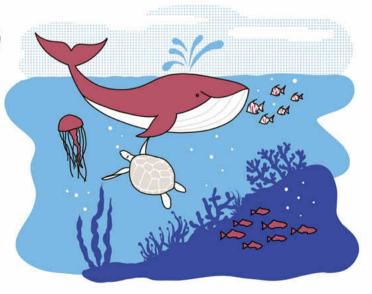


Productive and regenerative agriculture

Productive and regenerative agriculture can be of significant benefit to our food and land use system by transforming agricultural landscapes and farming practices. By combining traditional farming techniques with precision technologies, we can improve yields while protecting and increasing biodiversity.

Healthy and productive oceans

The global fishing industry has the potential to positively contribute to, and help maintain, healthy and productive oceans. Fisheries will need to be sustainably managed and limited to sanctioned catch zones, but sustainable and healthy aquaculture will reduce ecosystem degradation and help replenish global fish stocks.







As the global urban population rises, making our cities smarter and more sustainable – from transport to water supply and food waste – is crucial.

Our world is becoming more and more city-centric. Since the middle of the last century, the urban population has risen from 750 million to 4.4 billion. Today, more than half the world's population lives in cities, and the share of the urban population is expected to reach more than two-thirds by the middle of this century.

Cities are amassments of natural resources used to build and run them. Simply by looking at megacities such as New York, London, and Shanghai, it is obvious how resource-intensive they are. Whether or not a city is resource-efficient is less obvious. While cities in general can be considered resource-efficient, there is ample room for improvement and investment, especially in developing countries.

ECONOMIC POWERHOUSES

Cities are much more densely populated than the countryside, which means that people living in urban areas use less land per capita. In China, per capita living space in urban areas is around 20 per cent lower than in rural areas. Given that cities house more than half of the world's population but account for four-fifths of economic output, this suggests that overall people in cities are using their resources more efficiently than people in the countryside. This is for two reasons: proximity and productivity.

Proximity is directly related to urban density. Travel times within cities tend to be much shorter for goods and services, as well as for commuters. Moreover, journeys tend to be made on more efficient means of transportation such as buses and trains. Even though the Covid-19 pandemic is currently curbing the use of public transportation, we do not believe this phenomenon will last. Proximity within cities also adds to their productiveness. Productivity in cities is fostered by the fact that they allow us to specialise. Over time, we accumulate more and more knowledge in our area of specialisation, increasing our productivity. Cities also facilitate better skills matching, between employers and employees, between buyers and sellers, or between entrepreneurs and investors. Moreover, they do not only offer a higher probability of actually finding a match - a more difficult task in the countryside - but also offer a higher quality of available matches. All of this adds to the productivity and efficiency of cities.

EFFICIENT MANAGEMENT

Cities are not without their problems, though, and there are considerable differences across countries regarding resource efficiency. In general, it is fair to say that cities in developed countries are more resource-efficient than those in developing countries. It is also fair to say that well-planned cities are more efficient than those that sprawl in an unplanned, uncontrolled way. However, even cities with good infrastructure today could struggle as populations swell.

This raises the question of how cities can be better prepared for the future. Of course, we often think of the things we can see first – mobility, for example.

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Here, self-driving electric cars and sharing schemes could offer a way to reduce the overall number of cars in cities and improve the living environment. Constant improvement and expansion of mass transit systems will also be key. However, there are other, less obvious areas in need of attention. Water, both fresh and wastewater, is one resource that is dealt with very differently in different areas of the world. Some cities in water-stressed areas are suffering from enormous leakage levels in their fresh water supply. Places such as Rio de Janeiro, Mexico City, and Manila have leakage rates of 40–70 per cent, primarily due to poor infrastructure and theft.

Many developed cities have been introducing plans and processes to reduce their leakage rates. These include same-day repairs and the replacement of old pipes during construction works. In addition, early detection systems are introduced in order to discover underground leaks. If similar leakage prevention methods could be implemented in water-stressed areas, this could have a considerable impact on the resource efficiency of those cities.

While more responsible water management would make a big difference in many cities, the water use needs of cities should be put into perspective. Municipal and industrial fresh water use account for roughly 10 per cent and 20 per cent respectively of all freshwater use worldwide, which is significantly less than the 70 per cent that is related to agricultural fresh water use. However, as much of the food produced globally is consumed in the world's cities, their true water footprint is much higher if the concept of 'virtual water' (the water embodied in the production of food and fibre and non-food commodities, including energy) is considered. Therefore, finding innovative solutions for the production of food is also a pressing need that spans not only the topic of future cities, but also sustainable land use.

WASTE NOT. WANT NOT

Further down the food chain, one of the key issues is food waste. Globally, around 30 per cent of all food produced is wasted, predominantly at the consumer level. Tackling this issue primarily requires changes in mindset and behaviour, irrespective of whether people are living in the cities or in the countryside. The same applies to waste in general

- however, here we observe significant differences between the developing and the developed world. People in prosperous developed countries generate more waste – around 1.5 kg per capita per day, compared to 0.6 kg in developing countries. However, when it comes to the question of how all this waste is treated, around 30 per cent is recycled in the developed world, compared to only 5 per cent on average in the developing world. Furthermore, developed countries increasingly use waste-to-energy solutions, meaning that around 15 per cent of their waste is burned in order to generate electricity. Developing countries rely heavily on landfills or open dumps (75 per cent, compared to 50 per cent for developed countries), which are associated with significant environmental risks such as soil pollution.

Against this backdrop, the mantra for developed countries should be 'reduce, reuse, recycle' in that order to bring down their waste footprint. For developing countries, the priority needs to be introducing and expanding proper waste management systems that would be beneficial for both the environment and the population, and leaving ample room for investments. Independent of the country, cities should lead by example, as the economics of improved waste management are much more compelling in densely populated cities than in the countryside.

ROOM FOR IMPROVEMENT

While cities are already relatively resource-efficient, they have lots of room to improve. These improvements should be facilitated with the help of technology, which has the potential to make cities fit for the future, becoming ever smarter as data-driven solutions are implemented in the planning process and data-based decisions are taken. The rollout of the digital infrastructure in cities and the implementation of Proptech (property technology) look like promising longer-term growth stories. Smart citysolutions, including water leakage detection and optimised water management and waste collection, as well as improved waste management systems, are also key areas for further development. Cities that invest in these areas will reduce their water and waste footprints, paving the way for a less resourceintensive future, so that future generations can live on a better planet with smarter, more sustainable and, in the end, more liveable cities.



Carsten Menke CFA, Head of Next Generation Research, Julius Baer

In his role as Head of Next Generation Research, Carsten Menke focuses on urbanisation, the economic impact of mega cities and their influence on society.



URBAN NATURE

As told to John Franklin



In a recent conversation, architect Richard Hassell told us why, instead of pushing city boundaries outwards and encroaching even further on nature, we need to make our existing urban environments work more efficiently for their residents.

When WOHA Co-Founder Mun Summ and I were at university in the late 1980s, the world had just been through a massive oil crisis. After graduating, and with the crisis forgotten, we found ourselves in this time of excess and consumption, but our thinking was shaped by our education.

We started WOHA because we wanted to do more projects in line with our values. We started small, just the two of us, doing small projects where we could demonstrate our skill, before actively moving from housing into larger projects.

We were always interested in big ideas and have always thought about the future, aspiring to work on projects beyond individual houses. We felt that only architects could solve issues around how people should be living in the future – that is why public buildings, urbanism, transportation, and infrastructure are the most interesting projects to us. The key thing for architects is how we implement sustainable design strategies for the good of our planet. With the climate and biodiversity crises, and the current pandemic, it's apparent that a shift in attitude and decisive action are more urgent than ever.

ENDING THE SPRAWL

To us, traditional urbanism is too two-dimensional, and in order to give our projects impact we developed a three-dimensional approach. The way cities are designed now, we have different areas zoned for different purposes: residential suburbs, industrial areas, civic districts, business districts. This means people are constantly commuting between home,

work, and leisure activities, and many of those spaces are underused for long periods or even days. With the current pandemic forcing many people to work from home, central business districts are like ghost towns.

The problem with urban sprawl is that we spend so much stressful, emissions-generating time commuting that could be used differently, yet cities continue to grow and the 'megacity' is on the rise all over the world. We keep pushing our city boundaries outwards, encroaching more and more on nature and creating even longer distances for people to travel. This is why we need to start thinking three-dimensionally so that the city essentially acts as a giant building that allows people to live, work, and play all in close proximity.

If you look at city or urban planning but apply three-dimensional thinking – as you would when you plan a building, or you consider 'urban techniques' in your design process – then you start thinking of buildings as vertically stacked and multi-functional neighbourhoods; they will be integrated into the public transport grid, be places to live, work, play, relax, and provide services. People will act in the building as they would in a city context.

This three-dimensional thinking would encourage residents to see our projects as we do: components in large social, economic, and environmental systems. We want our buildings to interact with their context, the people, and nature. For that to happen they cannot be seen as isolated objects.

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For instance, high-rise greenery is not just for the inhabitants or users of the building – it has a biophilic and regenerative effect for everyone. It performs environmental services such as filtering the air, blocking out noise, absorbing heat, providing habitat for animals, in turn increasing biodiversity. Planting the greenery enables the building to develop positive relationships with its context and those who interact with it. Working in this way requires an important shift in mindset that is vital now more than ever, as we need to find a way of living in balance with the resources of our world.

DESIGNING FOR DENSITY

For WOHA, one of the main strategies to work towards this is designing high-density, high-amenity developments that enable us to give space back to nature, use fewer resources and, as shown by several of our prototypes, intensify nature in an urban setting. Covid-19 has made many people uncomfortable with the idea of living in a high-density environment, but if you look at places like Taipei or Hong Kong, which were able to manage the outbreak of the pandemic well, they are some of the densest cities in the world.

To make megacities liveable and environmentally friendly, we can't just pursue high density in our designs but must equally pay attention to providing 'high amenity'. You need a vibrant community on your doorstep with plenty of access to leisure activities, everyday necessities, and nature. We can build more densely but in a smart way so we have an abundance of community, green, cultural, and service spaces to provide people with wellbeing while still keeping the human scale.

These approaches are among many that can help urban development to combat the current ecological issues. We always try to find a solution that fulfils the client's brief, but also goes beyond that to add something good to its context in terms of social and environmental sustainability.

One simple approach would be to lower a building's energy and water consumption by implementing passive strategies like cross-ventilation, sun-shading, rainwater recycling, or photovoltaic systems. We often use landscaping as a way to shade the building from the hot tropical sun. The plants absorb the heat and cool the building's surface, and we don't need to use excessive air-conditioning in the interior, even less so if we have plenty of naturally ventilated spaces. Studies also show that plants cool down the ambient temperature around the building.

The Oasia Hotel Downtown, in the middle of Singapore's dense central business district, would be a good example. The entire building is wrapped in a low-maintenance green envelope and its surface temperature measures around 25°C, versus the 55°C of a neighbouring building wrapped in glass and steel. On a normal day, Singapore's average temperature is around 30–32°C. The hotel is a prototype that shows what could be achieved if more buildings were designed this way. Multiple buildings like it dotted throughout a dense district would be able to combat the urban heat island effect and lower the city's temperature.

In order to more readily encourage the adoption of some of these aspects into modern urban design, we have developed a 'systems approach'. This views



Richard Hassell, Co-Founder, WOHA

"To make megacities liveable and environmentally friendly, we can't just pursue high density in our designs but must equally pay attention to providing 'high amenity'."

Richard Hassell moved from Australia to Singapore to work as an architect shortly after graduating in 1989. He co-founded WOHA with Mun Summ in 1994. Hassell was awarded a Master of Architecture degree from RMIT University, Melbourne, in 2002. WOHA's projects have received international accolades, and the book 'Garden City Mega City' is dedicated to their work rethinking cities for the age of global warming.



URBAN NATURE 25

every project as part of the larger system – be that on a precinct or city-level – and can shape it to create productive relationships between city, people, and nature. Like this, the system becomes more complex, versatile, and resilient. However, all stakeholders need to be on board as this requires a lot of planning and coordination.

INTEGRATED LIVING

If this sounds abstract, an example is our Kampung Admiralty project, which won the 'World Building of the Year' in 2018 at the World Architecture Festival. Primarily a public housing development for senior citizens in Singapore, it is also a prototype the government wanted to explore for how we should live in the future. The development integrates seniorfriendly residential units, healthcare services, child and senior care, food and beverage options, retail, as well as a sheltered public plaza, a public rooftop park, and an urban farm. It provides all the services for your daily necessities, no matter what age bracket you fall into, and is designed to draw in the neighbourhood to create a vibrant, intergenerational community. It plugs seamlessly into the existing neighbourhood as well as the public transport network and has become the new heart of the community. The project shows how great things can be created if everyone sees the big picture.

One of our most recent projects – and smallest in terms of scale – has a lot of potential to offer a tangible view of that big picture. The Singapore Pavilion for Expo 2020 Dubai is a prototype that demonstrates a self-sufficient, lush oasis in the desert that can be scaled up to a district or city level.

Additionally, the Punggol Digital District in Singapore will be the first district to adopt an integrated masterplan approach that brings together a business park, a university, community facilities, and transport infrastructure. This planning approach enables collaboration between the different usecases, optimises land use, and fosters community. It also allows us to design and integrate innovative technological platforms from the ground up, transforming the way people work, live, learn, and play in an inclusive and sustainable environment.

When working on a municipal level, it is necessary to be able to give data-driven analyses of projects, so we developed a 'good' building rating system that counterbalances 'unpleasantness indices' – how many people can share the fewest windows for a high surface area to volume ratio, for example – with elements that people value such as green plot ratio. We have widely shared our scoring system, including with the mayors of London, Paris, and Istanbul, and the feedback has been that things like green/community plot ratio or civic generosity should become requirements for our industry.

One building or city doesn't make a huge impact in the grand scheme of things, but once you have multiple places that fulfil sustainability criteria and perform ecosystem services, then you start to see a difference. Adopted on a large scale, the comprehensive incorporation of nature into buildings in a functional and meaningful way could have a huge impact. This contact with nature, no matter where people live, forms a custodial mindset that makes people strive to take better care of our planet.

"Adopted on a large scale, the comprehensive incorporation of nature into buildings in a functional and meaningful way could have a huge impact."

NO TIME TO WASTE

Sanitation and waste are crucial areas where improvements can make a massive difference to the environment and communities, particularly in the developing world. We asked David Auerbach, Co-Founder of Sanergy, how his social enterprise is helping cities clean up.



Please tell us about your work with Sanergy.

Sanergy works to clean up fast-growing cities by taking a circular economy approach to solving waste management and sanitation challenges. We collect organic and sanitation waste to convert into valuable agricultural inputs, specifically by creating insect-based animal feed, by composting waste into organic fertiliser, and by turning waste into biomass briquettes. All these outputs are hugely valuable for agriculture and industry, as well as for improving farmers' incomes and addressing food security issues. We also help clean up fast-growing cities by ensuring sanitation waste is safely collected and treated properly, which has huge social benefits.

Why did you decide to build a social enterprise that focuses on urban sanitation and waste management?

We chose to focus on sanitation and organic waste because, first of all, it never runs out. Secondly, because it is a huge social challenge to solve. Where this waste goes matters. If it's not treated properly, it pollutes waterways and rivers and spreads disease. We ascertained that the waste was usable, but few people had thought about it from that perspective as, particularly in Europe and the United States, there are systems to just flush and forget.

Cities continue to grow rapidly, and the number of people living in informal settlements will reach an estimated 3 billion in the next 20–30 years. Solving the sanitation issue is going to be a mounting challenge. On one hand, while Sanergy is a social enterprise because it is tackling a social challenge, it is also an important business opportunity if you turn what you create into value.

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While it is clear that investing in social enterprises makes environmental and societal sense, as entrepreneurs why did you decide that Sanergy made sense from a business perspective?

Again, the input never runs out. From an agricultural perspective, there is a great opportunity to promote good, sustainable agricultural practices. For example, in developing countries they tend to import chemical fertilisers as a short-term solution, but in the long term this is a disaster; they deplete the soil of nutrients, reducing soil fertility, and eventually you lose the soil entirely. The way to solve problems like this is to create better products. We looked at this situation and saw a significant business opportunity, and, for us, all three of our agricultural inputs have market potential.

Sanergy is a long-term project with long-term goals. What do you ultimately hope to achieve with it, and what effect will reaching your goals have?

Within five years we expect to process more than a million tonnes of waste per year, and be present in at least ten cities across Africa and parts of Asia, because we believe Sanergy offers something highly replicable. The process changes how cities think about waste and its potential. By starting in Kenya, we have learnt to operate more leanly than elsewhere and be much more cost-effective than other circular economy companies from developed countries.

Just over nine years on from opening your first Fresh Life facility, do you have any advice for investors or entrepreneurs who are looking to become involved in social enterprise projects?

When becoming involved in a social enterprise, you have to realise it is not just a 'flash in the pan' or the latest technological breakthrough, and is something that warrants a longer, more involved journey. You are often working in locations with fractured ecosystems, or where doing business can be slower and more difficult due to anything from bad roads to poor Wi-Fi connections. Those considering social enterprises have to be honest about this, as it means a longer journey than the typical Silicon Valley venture capital-backed companies in the newspapers.

Sanitation is a fundamental aspect of life that many take for granted. What knock-on effects on communities are you seeing your project have?

The provision of safe and quality sanitation waste management services is important for cleaning up a city, reducing sanitation-related diseases, and improving the population's dignity. More fundamentally, we have created more than 350 jobs in the communities we serve, and indirectly support more than 3,000 people with jobs and increased income opportunities. Our model also encourages community ownership of our facilities – not just a social or private enterprise coming in as an outside organisation, but one that invests in and works on a project with the people it directly benefits.

More broadly, developing countries like Kenya are hugely dependent on agriculture still, and continue to rely on imported goods and services. By encouraging global sustainable agriculture, we can effect positive change for not only the farmers, but the economy too. We are operating primarily in a foodinsecure country, so being able to increase productivity through our insect-based protein for animal feeds and organic fertiliser is very important work.

What are the environmental upsides to greater adoption of projects like Sanergy?

In the simplest terms, because our solutions establish safe waste containment, collection, and treatment, they really do contribute to the rebahilition of ecosystems, in particular the Nairobi river, and combat the effects of climate change by offsetting more than 50,000 tonnes of carbon emissions a year from methane released by untreated waste.

What advice or comments would you offer to any investors who would like to be more involved in creating environmental impact with their investments?

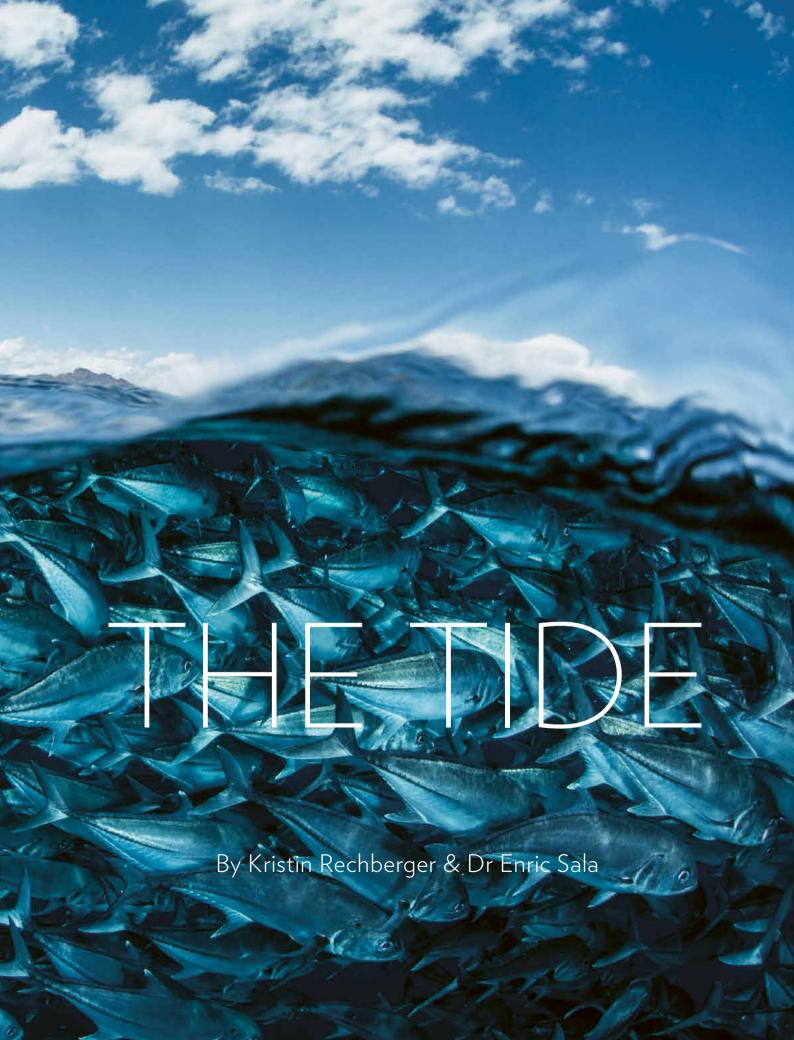
Investors tend to listen to investors, so pay attention to the ones who have actual feet on the ground in the countries and economies where the projects operate. They tend to help guide others to understand what they are investing in, as well as probably giving you access to the best companies involved. Spending time on the ground and seeing where the project operates is also important. It gives you a real sense of what the challenges and opportunities are.



David Auerbach, Co-Founder, Sanergy

David Auerbach co-founded the Kenya-based social enterprise Sanergy in 2011 with two fellow students from MIT Sloan. His interest in the developing world came from teaching in China in the early 2000s. Sanergy's social mission is to build healthy, prosperous communities by providing safe, accessible, and affordable sanitation for residents in informal settlements.





We depend hugely on our ocean, yet there is very little funding for work on its conservation. The world needs a sustainable ocean economy sooner rather than later.

Ocean life is a critical component of humanity's life support system, generating more than half the oxygen we breathe, providing food for billions, and capturing a quarter of our carbon pollution every year, among many other benefits. The ocean also provides at least USD 2.5 trillion in goods and services every year, from fisheries to tourism. If the ocean were a country, it would be the world's seventh-largest economy.

However, overfishing and human-made climate change are intensifying and depleting ocean biodiversity at an unprecedented rate. The global catch of wild fish peaked in 1995 and has been declining ever since; 90 per cent of the large animals in the ocean are gone; and studies forecast the collapse of most commercial fisheries by 2050 under 'business as usual'. In addition, coral reefs, oyster beds, kelp forests, and marine ecosystems that provide food security and other key benefits for hundreds of millions of people are being hammered by ocean warming and acidification.

This tidal wave of impacts will affect everyone on earth, but it will especially threaten the livelihoods and wellbeing of coastal communities, particularly in developing countries, given their reliance on ocean biodiversity for fishing and tourism. Unprotected seas with declining fish stocks will cause a decline in health for 1.4 billion people worldwide, for whom fish make up more than 20 per cent of their intake of key nutrients.

In short, if we don't reverse ocean degradation, the wellbeing of the entire global population is at stake.

Despite the absolute dependence of humankind on a healthy ocean and the urgent need to solve this global crisis, ocean conservation receives less public funding than the amount used for harmful subsidies that deplete ocean life, and only 0.1 per cent of global philanthropic funding. If we can increase investment in the blue economy, we have an opportunity to have a significant positive impact on the world around us.

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BROKEN RELATIONSHIP

The ocean crisis is no different from the loss of terrestrial biodiversity, global warming, or the Covid-19 pandemic. These are all manifestations of our broken relationship with nature, and are all problems that require long-term solutions.

However, there are three main areas where we can make more immediate improvements to the ocean. The first is to phase out fossil fuels and replace them with renewable energies. This will slow the warming and acidification of the ocean and sea level rise, and reduce the risk of losing all coral reefs in the next 20 years.

Second, we must change the way we take food from the ocean. Reducing fishing effort, eliminating harmful subsidies that perpetuate overfishing, and establishing strict catch quotas would reverse the current depletion of fish stocks. This would have to be complemented by sustainable fish and seaweed farming, which holds big promise for global food security if it is done well and not at the expense of other sea life.

Finally, it is imperative we protect at least 30 per cent of the ocean from fishing and other damaging activities by 2030. Protecting the right 30 per cent of the ocean will preserve unique and irreplaceable biodiversity and the environmental services it provides, and secure ocean carbon stocks that help mitigate global warming. In addition, the spillover of fish from reserves will replenish fishing grounds around them and yield better returns. Today, only 7 per cent of the ocean is in areas that have been designated or proposed for protection.

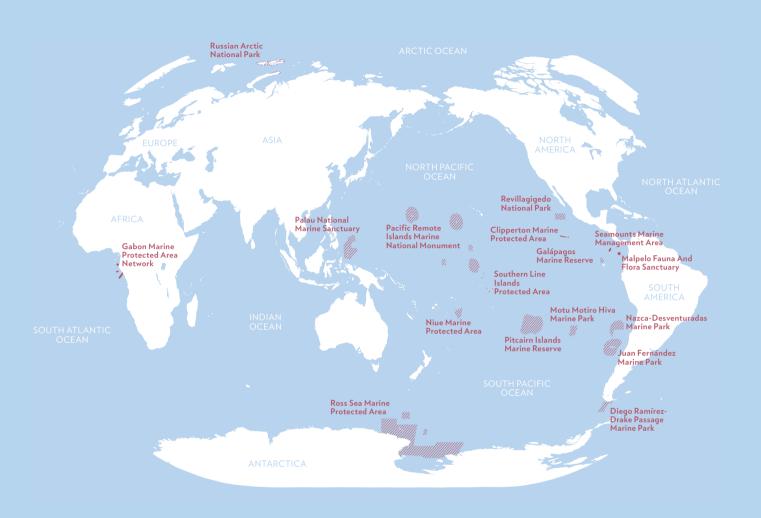
AN OCEAN MIRACLE: HOW MARINE LIFE RECOVERS IN MARINE RESERVES

In 1995, the waters off the small fishing village of Cabo Pulmo in Baja California were an underwater desert. The fishermen were so upset about not having enough fish to catch that they did something that no one expected. Instead of spending more time at sea, trying to catch the few fish left, they stopped fishing – completely. They petitioned the Mexican government to create a national marine park – a no-take reserve. Ten years on, everything had changed. What had been a barren landscape became a kaleidoscope of life and colour. In just ten years, it returned to a pristine ecosystem. Even the large predators came back – the groupers, jacks, and sharks. The visionary fishermen who initially petitioned the government are now thriving, making far more money from tourism inside the reserve and improved fish stocks around it.

FINANCING OCEAN CONSERVATION

Ocean conservation receives just 0.2 per cent of global official development assistance. However, the annual cost of protecting 30 per cent of the ocean is of the same order of magnitude as what governments pay to subsidise industrial fishing, and only a fraction of what the world spends on ice cream each year. There is enough public funding already, but it is used to over-exploit the ocean instead of protecting it. There is a need to accelerate the transition to 30 per cent ocean protection using an array of sources, including official development assistance,

NATIONAL GEOGRAPHIC PRISTINE SEAS AT WORK



Protected areas

Thirteen years ago, only 0.1 per cent of the ocean was highly protected, like Cabo Pulmo. That was the main reason we developed an initiative at the National Geographic Society in 2008 called Pristine Seas.

With 90 per cent of the largest predators in the ocean gone and global fisheries projected to collapse by 2050, it felt urgent to help protect the Serengetis and Yellowstones of our ocean, where the marine ecosystem continues to thrive as it has for millennia. Our goal was simple and clear: to help save the last wild places in the ocean before it's too late.

Initially, it was not easy to explain the benefits of leaving the ocean alone as it can seem counterintuitive; people worried that closing large areas to fishing would reduce the amount of food available for human consumption. But we've learned that the opposite is the case – the spillover of adult fish and the export of their eggs and larvae outside the marine reserves helps replenish the areas around them.

Marine reserves can actually be good business for communities. If equipped with proper business models and market access, these reserves can benefit locals relatively quickly and yield long-term benefits through tourism and commercial and

recreational fishing. The ultimate goal of these places includes effective protection and sustainable financing through well-managed conservation businesses.

We have had the great fortune of conducting 30 expeditions in the past 13 years to some of the last wild places in our ocean. Of those, 23 have been protected to date, covering a total area of 6.5 million square kilometres of ocean without fishing or other damaging activities. We need to regenerate the natural world so that it can help us regenerate ourselves, and protecting our ocean with initiatives like Pristine Seas is but one key component in reaching this ultimate target.

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domestic government budgets, climate financing directed to nature-based solutions, philanthropy, corporations, and new sources of revenue or savings through regulatory changes.

Private investors have a unique opportunity to invest in a sustainable ocean economy while preserving our life support system. Rather than thinking of nature as the place where our markets end, nature needs to be reframed as the place where the markets begin. The three principal areas for building a sustainable ocean economy are also rich in opportunities for impact investors.

In the energy sector, there are areas such as offshore wind and the ability to divest portfolios away from fossil fuels, while both seaweed and sustainable fish farming provide important alternative food sources. The second area is ecotourism - a recent report concluded that every dollar invested in protected marine areas yields a return of at least five dollars, while nature tourism was growing at 5 per cent per annum before the pandemic. Third, the long-overlooked nature conservation sector has enormous potential to boost our economies at a time when extractive sectors are slowing (agriculture and timber) or shrinking (fisheries), and there are innovative ways to diversify revenue streams for protected areas, including payments for the carbon sequestration benefits they provide. Geospatial analytics, data, and AI that are tied to ecological baselines will help restore the 'E' in ESG investing, helping with protected area enforcement and resilient, responsible supply chains.

Business and finance leaders can also support the global 30 per cent ocean protection target through operations and investments. First, businesses should adopt 'do no harm' policies and commit to not conducting activities that degrade the natural asset values of protected areas and intact ecosystems. Second, they should disclose transparent supply chains that do no further damage to ocean life. Third, in addition to 'doing no harm', we can all 'do good' by investing in 'conservation businesses' – ones that create combined financial, social, and ecological returns. Conservation business sectors for the ocean include regenerative tourism and responsible fishing operations.

WHY NOW?

2020 saw a collision of crises: the health and economic crisis from Covid-19, the societal inequalities that it has starkly revealed, and the nature crisis of intensifying global warming threatening life across our planet. The problem is so urgent that if we don't achieve the 30 per cent ocean protection target by 2030, the damage will be irreversible and affect everyone on the planet.

Investment in both a blue-green recovery and our ocean is crucial, not only because of the potential economic benefits, but also for self-interest. We need to regenerate the natural world so that it can sustain us. Ocean regeneration starts with ocean protection – regenerating marine life, food security and local economies. Ocean regeneration starts with you.



Kristin Rechberger is Founder and CEO of Dynamic Planet, a firm that helps advance and invest in markets that restore nature. She serves on a number of boards, including National Geographic Pristine Seas.



Dr Enric Sala is Explorer in Residence at the National Geographic Society, Founder and Leader of Pristine Seas, and author of the best-selling book 'The Nature of Nature: Why We Need the Wild'.

PROTECTING 30% OF THE PLANET



One of the most pressing risks to our global economy is the loss of biodiversity, and the expansion of global conservation areas to 30 per cent by 2030 is an initiative being spearheaded by the High Ambition Coalition for Nature and People in order to mitigate potential losses in the agriculture, forestry, and fisheries industries. Here we depict the potential outcomes from achieving the 30 per cent target or failing to do so.

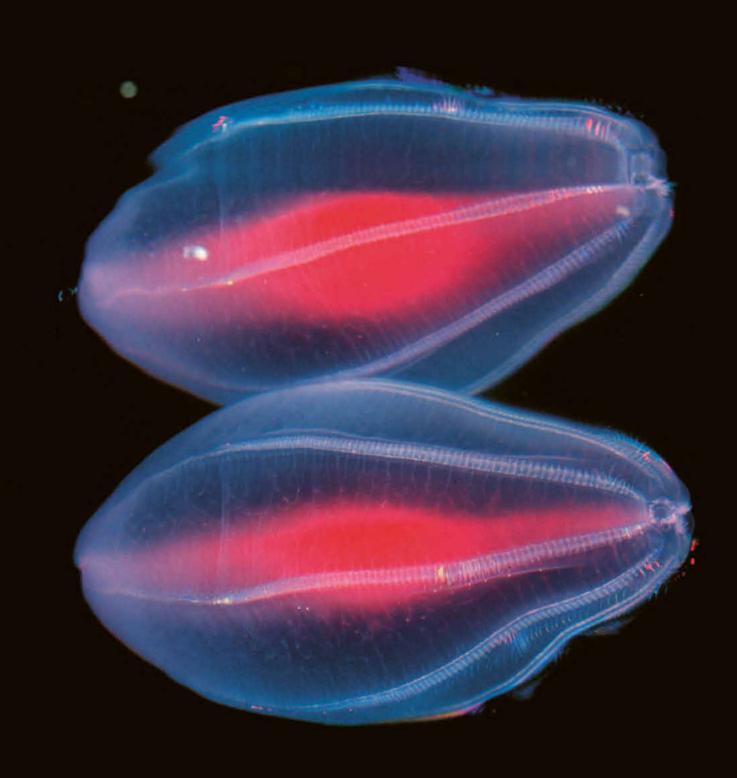


BUILDING ABLUE ECONOMY

By Janet Anderson

Tiago Pitta e Cunha has been working on ocean sustainability for more than 20 years. In his current role as CEO of the Oceano Azul Foundation, he is bringing governments, investors, and entrepreneurs together to try to build a bluer economy.





Oceans cover more than 70 per cent of the globe and are home to over 90 per cent of the habitable space on Earth. Their importance to mankind cannot be overstated. Seventy per cent of the oxygen we breathe is stored in them, food for more than a third of the world's population comes from the ocean, and more than 90 per cent of international trade is transported by sea. We are not only deeply dependent on the oceans, but they have also played a central role in our history. Despite this, we have explored just 5 per cent of them and know only a tiny fraction of the species that live within them.

"Oceans are a physical element of our lives, but have been largely ignored by policy-makers," says Tiago Pitta e Cunha, CEO of the Oceano Azul Foundation, a Portuguese organisation that advocates internationally for the world's oceans.

Born in a country with a marine territory that stretches far into the Atlantic, and whose history has been forged by seafarers, Pitta e Cunha is, in many ways, a pioneer. When he started working in the law of the sea in the 1990s, the oceans were not high on anyone's agenda. There were policies for shipping, ship building and fisheries, but not for the oceans. The United Nations Convention on the Law of the Sea – a comprehensive regime of law and order in the world's oceans – had been adopted in 1982 but it had taken 14 years of wrangling and still not everyone was happy with it. After this exhausting process, no one had the appetite to broach the issue again.

Pitta e Cunha set out to change that by bringing a new approach, looking at the entire ecosystem around oceans with a focus on ensuring long-term sustainability. He organised Portugal's first strategic ocean policy at the turn of the century, then moved to the European Commission to develop the European Integrated Maritime Policy before returning to Portugal, where he worked for the President of Portugal to promote an ocean economy.

By this time, interest was growing in the topic and Pitta e Cunha was approached by a multinational retail and agro-industrial group to help them understand more about the links between the ocean and a 21st-century circular bioeconomy. The Oceano Azul Foundation's project began in 2014 with a

meeting where 20 ocean experts and scientists from all over the world came to explain what the challenges were and how the ocean could play a critical role for the future of humankind. "After three days of brainstorming, it was clear we must invest in ocean sustainability," says Pitta e Cunha.

THREE-PRONGED APPROACH

The Foundation has three action areas: education, conservation, and advocacy and networking. Each one has a different time horizon: long, mid, and short-term. Education is about achieving results in the long term, working with children and young people, and advocating for a 'Blue Generation' that is more aware of the importance of the ocean and its fragile condition. In this work, the Foundation benefits greatly from its relationship with its neighbour, the Oceanarium in Lisbon – an aquarium that offers what Pitta e Cunha calls one of the best 'windows' on the ocean. Together, the two organisations work on building 'Blue Literacy', using their combined research resources to inform the public and raise awareness about the threats the oceans face.

"We are terrestrial animals – we immediately get the idea that forests are threatened. But the ocean is more difficult," says Pitta e Cunha. "We don't live in the oceans, so we don't realise that they increasingly lack the conditions to accommodate life. That's why we need to educate people."

ACCELERATING BLUE BUSINESS

The Blue Bio Value accelerator programme is a joint initiative by the Oceano Azul Foundation and the Calouste Gulbenkian Foundation. From designing specific fish feed for different types of fish production to using the by-product of fish manufacturing – the skin, bones, and fatty acids – to produce nutraceutical supplements like calcium and Omega 3, the range of ideas is diverse. These are some of the start-ups that have benefited from the programme...

SEAentia

Providing a growing global population with protein is a major challenge for food producers. Aside from plant-based alternatives to meat, fish as a provider of protein has the potential to help meet rising demand while reducing greenhouse gas emissions, according to a white paper published by the World Economic Forum in 2019. SEAentia, a Portuguese start-up founded in 2017, set out to develop aquaculture engineering methods for the farming of meagre. This rapidly growing fish with low muscular fat content and a high dressing percentage (its meat yield) is particularly sought after in Asian markets. However, according to SEAentia there is no data on meagre cultivation in recirculating aquaculture farming (RAS). SEAentia aims to perform scientific trials to pioneer environmentally friendly production from hatchery to commercial size by optimising feed utilisation, avoiding chemicals and maintaining water quality and animal welfare. The enterprise jointly won the first edition of the Blue Bio Value accelerator programme in 2018.

Biosolvit

Oil and fuel leakages are a serious hazard for marine life and water supplies intended for human consumption. They may occur during embarkation and disembarkation of oil tankers or transport of oils and fuels. Petrol-based liquids pose a threat on- and offshore in hangars, service stations, ports, and marinas. Brazilian company Biosolvit produces oil absorption and containment products with oilabsorbing substances developed using biocomposites from renewable sources such as vegetal fibres. The company, which jointly won the Blue Bio Value accelerator programme in 2019, also manufactures organic alternatives for conventional soil fertilisers with high levels of water and nutrient absorption capability. The company's aim is to provide clean technologies at the lowest cost for international markets.

SaltyCo

The fashion industry has one of the biggest environmental footprints. According to the World Economic Forum, the sector produces 10 per cent of all humanity's carbon emissions and is the second-largest consumer of global water supplies. The World Wildlife Fund says that 2,700 litres are needed to produce a single T-shirt due to waterintensive cotton farming and production 2020 Blue Bio Value accelerator programme, manufactures a novel fibre derived from salt marsh plants. The salt-tolerant plants are grown freshwater-free, significantly reducing the environmental footprint of the fibres. The first application of the biodegradable fibre manufactured by the UK-based company is for padding apparel. SaltyCo is a spin-off from the Royal College of Art and Imperial College London and was formed on a postgraduate master's course called Innovation Design Engineering. The interdisciplinary team combines expertise from engineering, chemistry, business and design.

The second action area, conservation, is about building marine protected areas and working with fishermen and women, NGOs, universities, and governments to improve the management of fisheries. "Conservation is about acting in the mid-term. We need to do this to save what's left. We can't wait for the next generation to come and save the oceans – there will be nothing there by then," he says. One focus area is the Azores, a marine area so vast that what happens there influences the climate and weather across Europe. The Foundation is advocating for the regional government to make 15 per cent of its 1 million square kilometres into a Marine Protected Area (MPA).

The third action area is blue networking. "This is about ocean diplomacy," says Pitta e Cunha. "We work with the United Nations and the European Union to press them to adopt the right policies for the ocean. We call this our short-term horizon." The Foundation works with nature conservation organisations like the World Wildlife Fund, Conservation International, the Nature Conservancy, Ocean Conservancy, and others. Together they have developed an agenda for the oceans called 'Rise Up - a blue call to action'. With more than 400 ocean organisations as signatories, it sets out in clear and concrete terms what needs to be done and by when. "We have been procrastinating for too long", says Pitta e Cunha. "The scientists knew about the threats in the 1970s, but in the last 50 years we have not made much progress, with very unfortunate consequences."

BLUE OCEAN THINKING

Protecting, conserving, and understanding the ocean are vital. But it is also important to bring forward innovative sustainable business models and encourage the development of a blue economy. The Foundation therefore runs, together with the Calouste Gulbenkian Foundation, an accelerator where blue biotech start-ups from all over the world receive support.

"Conservation efforts alone will not be enough: in the 21st century if we are to save the planet, we need to change the economy," says Pitta e Cunha. "People are starting to understand that. At the Foundation, we want to help prepare for the new economy, because entrepreneurs can be the engine of change."

INVESTING IN BLUE

It's not just about how we act, but also about how we invest. The key to this, according to Pitta e Cunha, is simple – any idea that hopes to be successful must have sustainability at its heart.

"It is about how we use our natural capital," he says. "A lot of businesses will be structured around renewable marine protected areas and generating the financial instruments to sustain those areas. There will be investments to make in blue biotechnology, green shipping, and marine sources of protein to meet the dietary requirements of our growing global population." When nature – and blue nature in particular – is part of the cost-benefit analysis of the economy, that will change our view of many activities, such as offshore oil extraction.

"We must learn to see environmental protection as an investment, not a cost, and to understand that the living organisms of this planet are critical for our survival and so must be valued as such," says Pitta e Cunha. "When nature is part of our cost-benefit analyses, that will change which businesses are profitable and which are not."



Tiago Pitta e Cunha, CEO, Oceano Azul Foundation

Tiago Pitta e Cunha grew up in Portugal, a country with one of the largest marine areas in Europe, but ironically did not discover his interest in the ocean until he was studying in London. In the mid-1990s he went to work for the United Nations on ocean law, and since then he has dedicated his career to advocating for the oceans.

THE UPCYCLING CHAIN

Thomas Schori, Founder of Tide Ocean SA, turns plastics from our oceans into new sustainable products. He tells us how it all works and how he would like to see the upcycling industry develop.



Please tell us about the work you are doing with #tide and its mission.

Over many years in business, we learnt that within the field of sustainability there is a lot of 'greenwashing'. Many companies say that they are saving the world, the oceans, and the environment, but it just isn't true. We came up with the idea for a fully transparent product that would play on completely open storytelling and transform waste into value. From the start, our books have been open to everyone at every stage – from the collection of plastics to the processing and even production when our customers are creating products with raw, recycled materials.

With #tide, our mission is to have environmental impact as well as social impact. We have established a complete supply chain where we involve local people, communities, industry, and brands. In Southeast Asia, we task local fishermen with collecting ocean plastics,

for which they are fairly paid; then their village or community will sort the plastics, also receiving a wage for doing so. We create value for the fishermen and villagers – they can support their families while making a vital social contribution to helping the environment.

The plastic collected is then upcycled into working-quality raw materials, either granules for use in things like watch-making or the automotive industry, or a yarn, which can be used to create apparel or carpets. This transparency allows us to collaborate with our customers to fully explain the story of the product and the material to the end consumer. This process gives trash a value, injects it into the economy, and allows for a 100 per cent circular economy product.

Why did you decide to work with ocean plastics?

As Vice President of the Braloba Group, I know the watchstrap and bracelet industry inside out. We use

THE UPCYCLING CHAIN 43

a lot of polyester – which is plastic – in our production process, so in researching this I have learnt that hundreds of millions of tonnes of new plastics are produced every year. This is a huge problem – 8 million tonnes end up in our oceans every year. We asked ourselves, "Why don't we make use of this trash? Is it possible to upcycle it in some way?" All the industry leaders we approached said they would not touch trash and it could not be used. They felt they had to keep producing new, virgin plastic.

We approached the Swiss University of Applied Sciences and asked them to evaluate whether ocean 'trash' plastic could be upcycled. After two years, the research students working on the project – together with Professor Daniel Schwendemann – proved that this ocean plastic could be reprocessed into virgin-quality raw material. We had found a method to give trash a value and close the circle. The next step was to reach out to our ecosystem at Braloba and ask, "Are you ready to use waste?" They all said that as long as the quality and price were good, they would be happy to use our product. The feedback from the market has been great.

Removing single-use plastics is one of our driving goals with #tide, but it also reflects the work we are doing at Braloba. We consider every raw material we use, every emission we create, and constantly ask ourselves if there is a way we can improve our processes. We understand that for some uses and industries it is important to only use virgin materials – the food industry, for example – but if we have a way to use that plastic again, to ensure it is not only used once and thrown away, we can make a significant impact on the world around us.

It is clear that investing in the blue economy makes environmental sense, but as an entrepreneur and direct investor in #tide, why did it make business sense for you?

If you think of the numbers, using what already exists can make great business sense; recycling plastic saves 52 per cent of the energy you would use to create something new. Of course, building a supply chain takes considerable effort. However, there is growing consumer demand for more sustainable options; customers care about the environment and will pay more for products aligned with their values.

As investors, we are convinced that the impact investment movement will not go backwards; it will only become bigger. Even despite the Covid-19 pandemic and the resulting economic crisis, the social ecological movement hasn't gone away. And there is political demand for solutions regarding environmental issues such as pollution or our consumption of greenhouse gases. The demand for sustainable options is the same as last year, so now is the perfect time for businesses like #tide to break through.

#tide is a long-term project with long-term goals. What do you ultimately hope to achieve?

We don't just see #tide ocean material as a brand, we see it as a label for responsible plastic consumption. Our target is that when people buy something made using plastic, they will decide to go for a #tide product instead of one that is newly produced. We have already proven that we can create profit out of this business so it will sustain itself, and, because this is a volume game the more plastic we process, the more value we create.

Sustainability is not something we are focusing on to please our customers or investors, though; we primarily want to please ourselves with our general sustainability mission. You can buy a certificate, you can employ people and have a certification quite easily, but our mission is to change people's thinking about how we consume. It is a very long process, a lifelong commitment.

What would you say to investors and entrepreneurs looking to invest in the blue economy?

Our main piece of advice would be make sure the project you invest in is 100 per cent transparent, traceable, and true. It has to be credible, because if not, it is just greenwashing. An investor should look deeper into any project they are interested in to see what they are really doing and ask difficult questions. The focus should only be on real, sustainable raw materials that can balance the higher price with the social, ecological and environmental benefits.

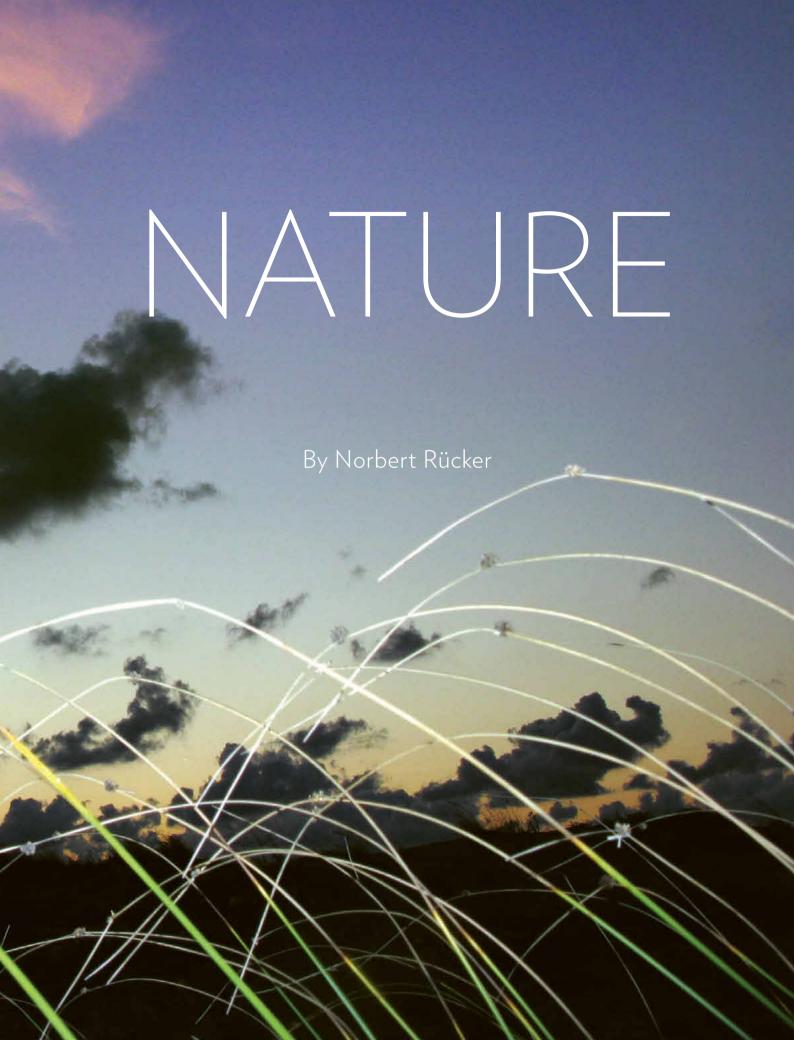
For the blue economy as a whole, we need to focus on our oceans. They cover more than 70 per cent of our planet, deliver vast amounts of food, and are the source of our climate. The better we treat the oceans, the better we treat the world in general.



Thomas Schori, Co-Founder, Tide Ocean SA

Thomas Schori became interested in turning plastics into new sustainable products through his work at Braloba Group, a Swiss watchstrap manufacturer. Tide Ocean SA, which he co-founded alongside Marc Krebs, has been selected by the UN as one of the most promising start-ups supporting its Sustainable Development Goals.





With climate change now finally at the forefront of financial decision-making, it's biodiversity that demands more attention from responsible investors, for all our sakes.

At last, climate change has become a topic that towers over financial markets. We have come a long way in identifying its economic legacy, in understanding its transformational forces, and in distilling such insights down to the very bottom of financial markets. There is ever-increasing transparency and awareness about the loans on bank balance sheets, the investments in wealth manager portfolios, and the risks and opportunities such positions entail from a climate perspective. Yet when it comes to our planet's wellbeing, there is no respite. While we have only just begun to tackle the challenges of climate change, the topic of biodiversity incrementally moves out of its long shadow.

Biodiversity and climate change are deeply connected by the simple fact that our economy relies on natural capital. We may easily get the impression that innovation and technology determine our society's wellbeing. However, we do not have to look far for a reminder of how the use of land still offers the basics of everyday life. The World Economic Forum estimates that roughly half of the world economy is highly or moderately dependent on nature. Food and agriculture is the obvious example of the value add offered. Tourism in some cases might be another.

Meanwhile, the dependence of the pharmaceutical industry on nature is lesser known. The challenge is the loss of biodiversity as natural habitats degrade:

deforestation, pollution, and global warming are only some of the ways we interfere in ecosystems and threaten their balance. Pollination is key to agriculture and the shrinking population of bees has become a widely recognised, tangible example of how biodiversity issues translate into economic ones.

CHANGE OF PATH

Continuing on today's path jeopardises the value add provided by nature. Today's path risks destabilising the balance of ecosystems beyond their tipping points, unleashing self-reinforcing forces of destruction and degradation. Deforestation in South America and Southeast Asia, scientists warn, could lead to an irreversible transformation of rainforests into savannah, sending shockwaves into an ailing global climate system. The United Nations Sustainable Development Goal 15 - life on land - aims to raise awareness and foster action against these risks. Only by following a path of sustainable land use through protection, restoration, and responsible use of resources can we also rely on the value add nature offers. Covid-19 sounded the alarm bell on biodiversity, but this alarm goes almost unheard among the noise of the broader crisis. Six out of ten infectious diseases are zoonotic, i.e. illnesses that spread between animals and people, according to the US Centers for Disease Control and Prevention. Covid-19 is zoonotic and in part was the result of human interference with natural ecosystems.

FORCE OF NATURE 47

Biodiversity and climate change also are distinctly separate. We measure, or at least approximate, greenhouse gas emissions, which offers an element of control. Our purchases of goods and services, and the supply chains attached to them, leave a carbon footprint. Metrics such as CO₂e (carbon dioxide equivalent) emissions per kilogram of food consumed, per kilometre of distance travelled, or per million sales of corporate activity make this trail of greenhouse gas emissions visible.

Measuring the loss of biodiversity remains a great challenge, and there are credible calculations showing how the planet's extraordinary variety of species shrinks every year. However, such metrics lack a clear link to our consumption habits or corporate activity, and because biodiversity is about greatly diverse ecosystems, there is huge variability in how we interfere harmfully, how we overuse natural resources, and which metrics we should apply for measurement. Whether it is agriculture, fishery, or forestry, each activity requires a different methodology to map its impact on biodiversity in a meaningful way.

COMPLEX PROBLEMS

Biodiversity outshines climate change in its complexity. From a simple perspective, the vast majority of greenhouse gas emissions boil down to fossil fuels and cows. Relying less on both is the straightforward, yet difficult to achieve solution. The plastic bottle is an example of the complexity of non-climate pollution. The material itself offers superior qualities in terms of packaging, enabling safe supply chains, weight and re-use. Recycling the staple plastic is less energy- and resource-intensive than recycling glass, an alternative for many uses. Unfortunately, reality differs from theory. Special-use plastics, leaking recycling loops, littering, and overuse of packaged goods are some of the many reasons we use too much plastic and it has become an environmental burden.

Natural resource-derived plastics could in part substitute fossil fuel-derived plastics, but this alternative supply chain brings its own set of environmental challenges, including burdensome land use. This example shows that plastic's sustainability issues are less about the material and more about its use, economic development, and cultural values. This complexity is characteristic for most biodiversity issues.

Financial markets are at the very beginning of incorporating the topic of biodiversity, in part because of complexity and unsolved measurement difficulties. Financial markets are a rough mirror image of the economy, with the caveat that some businesses are over-represented and some are under-represented.

The fossil fuel business is capital-intensive and relies on investors offering equity or debt funding. Its presence on financial markets was pivotal for integrating the climate perspective from an investment angle. The key businesses at the front line of biodiversity loss, however, seem rather under-represented. Agriculture, forestry, and construction are largely private enterprises, at times small, at times large, at times with close ties to government, and they tend to rely on local bank loans rather than funds from a global investor base.

ADAPTING SWIFTLY

Facing all these hurdles, we must focus on what we know. Tackling the loss of biodiversity requires relevance and attention, which accelerates the transition of business and forces companies to adapt to change. Crop chemicals and fertilisers are at risk of tighter regulation, and producers are under pressure to develop products and practices that foster more sustainable agricultural practices.

This is one of the biodiversity front lines for equity markets. Innovation is sweeping through the areas of farming and food alternatives to meat, in part thanks to technological advances such as low-cost LED lighting and digitalisation enabling new methods of indoor, high-value-add crop cultivation. The advances in image recognition and robotics allow the use of new agricultural equipment that boosts productivity and curbs environmental harm of fieldwork. This is one of the biodiversity front lines of private growth capital markets as some countries and economies are under threat of losing natural capital in the long term as arable land degrades. Data to identify and understand the related risks are under development, but embedding this perspective into the analysis of a country's long-term prospects and its implications for government debt are one of the front lines of economic research. Biodiversity is the chapter of the responsible investing journey that we have only just begun to write.



Norbert Rücker, Head of Economics & Next Generation Research, Julius Baer

Norbert Rücker has an analytical emphasis on commodity markets and specifically energy. He also focuses on the structural changes in world energy markets and the implications for global mobility. He is a member of Julius Baer's Responsible Investment Committee.



BETWEEN

FIELDAND

By John Willis

FORK

Unsustainable agricultural practices have contributed to the perilous situation the world now finds itself in. Shifting capital market finance towards sustainable food and agriculture is essential if we are to reverse some of the damage.

Financial markets and companies face existential risks as a result of unsustainable land use, including deforestation caused by food and agriculture systems. Companies along the food and agriculture supply chain, from 'farm to fork', directly depend on healthy natural capital as the basis for resilient agriculture systems. Without productive soils, abundant water, pollination, regulation services, and stable climatic conditions, most agricultural systems fail to meet potential production yields.

Without strategies to manage risks emerging from further natural capital loss at both local and global levels, companies, their investors, and, to an extent, wider financial markets' exposure to climatic and environmental risks will be heightened. All these shocks will then impact on production, growth, and value generation, with negative effects on company revenues and expenditure and, as a result, macroeconomic stability, meaning the taxes and employment these companies generate.

Taking a high road transitioning towards sustainable agricultural systems offers a chance for markets and investors to benefit from more resilient agriculture production, new regenerative technologies and more consistent performance.

SYSTEM REBOOT

Today's business-as-usual food and agriculture systems are not compatible with maintaining economic, societal, and environmental stability. Agriculture should be at the forefront of positive climate transition and the reversal of biodiversity losses. Managed sustainably, the sector is capable of sequestering carbon dioxide out of the atmosphere, storing vital nutrients and water for future generations, and providing valuable habitats for flora and fauna, as well

as offering significant economic benefits. According to the World Bank, in 2019 an estimated 26 per cent of the global working population was employed in this sector, with agriculture, forestry, and fishing amounting to roughly 3 per cent of global GDP. Conversely, unsustainably managed food and agriculture systems generate significant environmental and financial costs and losses (see 'Scope for improvement', below).

Unsustainable agriculture has been a major contributor to global declines in biodiversity and natural capital. In 2020, research highlighted that critical ecosystems on which societies and economies depend are dangerously close to collapse. The UN Convention on Biological Diversity's Global Biodiversity Outlook found that none of the 2011–2020 Aichi Biodiversity Targets has been met. In parallel, WWF's Living Planet Report 2020 revealed that, based on 4,392 species assessments, global populations of vertebrate species have declined by an average of 68 per cent since 1970.

Agriculture is a driver of biodiversity and natural capital losses, and deforestation to clear land for it

SCOPE FOR IMPROVEMENT

The United Nations Food and Agriculture Organisation (FAO) estimates that between a third and a quarter of all food produced for human consumption is wasted between field and fork. This loss is the equivalent of 24 per cent of all human food calories produced. The EU estimates that total associated annual costs of food loss and waste in the EU amounts to EUR 143 billion, split 49 per cent from production, handling and storage, processing, wholesale/retail and food service sectors, and 51 per cent attributed to consumption or post-wholesale/retail.

has been one of the main drivers for this in recent decades. The FAO estimates that 73 per cent of deforestation in tropical and subtropical countries between 2000 and 2010 was associated with agriculture. These losses make agricultural systems less resilient to climate change, pests, and pathogens.

Furthermore, many parts of the world experienced record levels of wildfire, drought, and flood in 2020, with farming workforces – particularly in developing states highly dependent on agricultural production for food and exports – unable to work for large parts of the year.

Under these conditions, forecasts show that business-as-usual agricultural production will not be capable of healthily feeding a global population by 2050 and the EAT-Lancet Commission has found that, based on current food prices, by 2050 at least 1.58 billion people (roughly 20 per cent of the global population) will not be able to afford a basic healthy diet. Already, approximately 57 per cent of the population cannot afford a healthy diet throughout sub-Saharan Africa and Southern Asia.

INVESTING ISSUES

The confluence of these environmental, social, and economic factors raises material issues for investors, companies, and financial markets. Transitioning to sustainable agricultural systems will require investors and markets to change how they finance the industry. A sustainable transition could reveal investment opportunities such as new technologies, green bonds, and alternative proteins – however, failure to achieve such a transition would result in increasingly volatile production systems, supply chain disruptions, and uncertain market conditions.

Agricultural markets will not achieve global sustainable food systems without investors, credit providers, and insurers aligning to leverage their capital and services for that specific purpose. Shifting capital market finance to food and agriculture industries and catalysing a move toward sustainable practices will reduce the effects felt by investors due to land use change, climate risks, and biodiversity loss. This shift also offers the potential for improving long-term returns, as well as achieving positive social and environmental impact.

PUTTING THEORY INTO PRACTICE

Research conducted by Planet Tracker highlights how investors and lenders can contribute towards responsible stewardship of agriculture and a global transition towards sustainable food systems, and three specific areas have been identified where investors can help encourage this. First, working with companies to change how they operate and setting sustainable targets can help them become more sustainable in their land use and management of natural capital – specifically addressing deforestation – in alignment with industry standards and best practice. Second, with the restructuring of existing financial products and the creation of new ones, asset managers, banks, and sponsors can reallocate capital or dedicate new financial instruments to support a transition towards positive natural capital and climate management in agricultural systems. This may involve applying screening criteria to new and existing investments during the selection process, and should align with global impact targets set out by the UN Sustainable Development Goals, the Task Force on Climate-related Financial Disclosures, the Inevitable Policy Response, and the EU Sustainable Finance Taxonomy. And third, by adopting transparent investor policies, asset owners and managers can publicly endorse support for sustainable agricultural practices through policy and stewardship statements. These could include guidelines set out in the PRI-Ceres Investor Initiative for Sustainable Forests, the PRI Responsible Investment in Farmland, the CFS Principles for Responsible Investment in Agriculture and Food Systems, or the OECD-FAO Guidance for Responsible Agricultural Supply Chains.

PLANET TRACKER

Planet Tracker is a non-profit financial think tank aligning capital markets with planetary boundaries that was created to investigate the risk of market failure related to environmental limits. It generates breakthrough analytics to redefine how financial and environmental data interact, with the aim of changing the practices of financial decision makers to help avoid environmental and financial failure.

Planet Tracker's Land Use Programme combines sciencebased food system research, environmental metrics, land use change, and company financial analytics to reveal the systemic market and company consequences of failing to achieve sustainable and net zero deforestation-free food systems by 2030 and on to 2050.



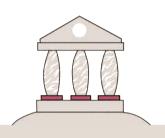
John Willis,Director of Research,
Planet Tracker

John Willis has more than 30 years' experience in finance, having worked in research, portfolio management, and trading, and performed various management roles. Before joining Planet Tracker he was Global Head of Research at Deutsche Asset Management and co-founded Sustainable Insight Capital Management, an asset manager of a range of equity funds for sustainability-conscious investors.

NATURAL

TRADITIONAL CREDIT RATING FACTORS

NATURAL CAPITAL LINKS TO SOVEREIGN HEALTH



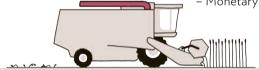
INSTITUTIONAL ASSESSMENT

- Policymaking and political institutions
- Transparency and accountability
- Debt payment culture



ECONOMIC ASSESSMENT

- Gross domestic product
- Inflation
- Monetary base





EXTERNAL ASSESSMENT

- Current account receipts and payments
- External debt





POLITICAL AND HAZARD EVENT RISK

- Political risk
- Natural disasters





NATURAL CAPITAL 53

CAPITAL

ENVIRONMENTAL GOVERNANCE

Environmental policy, such as nationally determined contributions, natural capital protections policies – i.e. no deforestation, use of fires, input control, protected species – and their implementation, monitoring, and enforcement.

LOST PRODUCTION AND INCREASED VULNERABILITY VIA NATURAL CAPITAL IMPACTS

Changes in production capacity due to natural capital loss from soil and water degradation, changes in agro-ecological zones for production, increased vulnerability to natural disasters and climate impacts, and potential breakdown in ecosystem services.

LOST MARKETS FOR NATURAL CAPITAL-INTENSE PRODUCTS

Changes in current account revenues from natural capital-intense products such as soft commodities at risk from more stringent environmental policies and natural capital degradation/climate change. Subsequent impact on exchange rates and debt profile.

LOST PRODUCTION AND WELFARE DUE TO FREQUENT NATURAL DISASTERS

Economic, social, and environmental losses due to greater impact from natural disasters and potentially higher frequency of them.

FISCAL ASSESSMENT

- Debt and government debt/GDP
- Net financial assets



FISCAL BALANCE DETERIORATION TO SUSTAIN WELFARE IN THE MIDST OF SHOCKS

Changes in tax revenues and expenditure as a result of changes in production capacity, reduction in external markets, and losses linked to greater political and hazard event risk. Cost of infrastructure to replace ecosystem services.



WINDOW ONTHE WORLD

By Christophe Christiaen

Massive advances in geospatial data have helped us to analyse various planetary changes – but they also have the potential to transform our financial system, including improvements in transparency.

In nearly every aspect of life – be it personal or professional, scientific or financial – data is analysed in order to reach conclusions and make decisions. The greater the amount of data available, the more detailed the analysis can be, and the more informed the decisions taken. Nothing has helped this increased availability of data at our fingertips more than the advance of technology.

Today, tools such as artificial intelligence and satellites observing the earth from orbit mean that data can now be used effectively when assessing a wide range of sustainability risks, opportunities, and impacts such as extreme weather events.

The resulting growth in geospatial data – any data that has a geographic element to it – is of particular benefit to the financial industry. Integrating geospatial data and analysis into financial theory and practice is a discipline called 'spatial finance', a term coined by researchers at Oxford University. This new discipline has helped increase transparency within the financial system for investors and data providers alike. Opportunities for financial institutions to develop their own geospatial capabilities have also arisen, enabling them to gain a competitive edge by combining financial returns with sustainable outcomes.

A WORLD OF DATA

More geospatial data is being collected than ever before, due to unprecedented public and private investments in the space sector that are driving down costs and attracting start-ups and entrepreneurs to enter the market. New generations of small satellites are orbiting our planet, taking high-resolution images of every point on earth. This means we can observe planetary-scale change such as deforestation, melting polar ice caps, or extreme weather on a daily basis.

In addition, new sensors capable of tracking maritime vessels and aircraft, understanding localised weather patterns, measuring asset-level greenhouse gas emissions, and monitoring economic activity make it possible to analyse our world like never before. Advances in data science and AI make it possible to process this vast amount of data while helping technologies to become more affordable, accessible, and effective for a wide range of industries.

PRACTICAL APPLICATIONS OF SPATIAL FINANCE TECHNOLOGIES

Governments, regulators, companies, investors, and civil society will be able to use these technologies to tackle a wide variety of challenges around the world in new ways:

Asset owners will be able to test portfolios against their investment beliefs.

Asset managers will be empowered to engage actively with investees in a timelier manner.

Banks will be able to assess their loan portfolios against their sustainability policies and commitments.

Corporations will be able to verify internal data collection and compare performance with peers, or understand biodiversity risks and impacts within their supply chains.

Regulators will be able to better assess environmental and social systemic risks within the financial system.

Policy-makers will be able to track progress against the Paris Agreement.

When it comes to financial decision making, satellite Earth observation (EO) data is highly relevant. As a source of information, it is neutral, unbiased, and consistent. It is also global and frequent, enabling decisions to be made at the most opportune time, while providing insights on a wide range of economic, social, and environmental issues across all sectors of the real economy.

INCREASED TRANSPARENCY

By integrating this vast quantity of data and analysis into financial theory and practice, EO, combined with machine learning, has the potential to transform the availability of information in our financial system and increase transparency. It allows financial markets to better measure and manage risks related to sustainability, as well as a vast range of other factors that can affect risk and return in different asset classes.

The use of geospatial solutions and EO data in the financial sector is not new. Research by the Spatial Finance Initiative – a partnership between the Alan Turing Institute, the Green Finance Institute, the Satellite Applications Catapult, and the University of Oxford – has found more than 100 organisations already offering geospatial products or services to financial institutions.

A WEALTH OF OPPORTUNITY

With ever improving data collection and processing technologies, the spatial finance landscape is changing rapidly. This presents financial institutions and data providers with the opportunity to enable a whole range of new use cases in the ESG sphere, including climate risk assessments, environmental impact monitoring, and investing in nature. Both EO and AI are cost-effective, agile methods of monitoring environmental impacts at scale. Physical climate risks such as wildfires, flooding, or drought can be assessed from asset-level upwards, and applied to single entities such as specific companies or across entire countries. Less tangible climate risks such as greenhouse gases and carbon emissions can be monitored through production indicators. The benefit for companies is greater ability to attribute the impacts to operations and supply chains, giving them greater understanding of reputational damages or liabilities.

MATURE APPLICATIONS OF GEOSPATIAL PRODUCTS AND SERVICES

- Insurance underwriting and claims management, commodity trading insights, and business intelligence. For insurance, EO data traditionally feeds into natural catastrophe models or provides project specific insights to price bespoke risk products. Increasingly, EO data from satellites or drones is also used to rapidly assess damage and losses over large areas right after natural disasters such as hurricanes or flooding.
- For commodity traders of both soft and hard commodities, geospatial data provides near real-time information about production outputs, cargo in transit, or drivers of demand. Products that are typically tracked include agricultural (corn, soy, maize, coffee), energy (oil, gas renewables), and metal (steel, copper, aluminium) commodities.
- Geospatial data and analysis is also used to extract general business intelligence insights such as footfall in retail, economic growth, and manufacturing, construction, and logistics activity on a site, regional or company level.

Geospatial analysis can also be used to identify investment opportunities in nature-based solutions, such as assessing the potential for carbon capture or ecosystem service restoration, while geospatial tools allow for cost-effective monitoring, reporting, and verification of investment projects' impacts and progress. Overall, this increases the trust and transparency needed to scale up natural capital markets.

The potential for geospatial services in the financial sector is huge. In the coming years, technological advances will result in many more applications and uses for these capabilities, offering a previously unimagined level of awareness and information at experts' fingertips. The speed and the scale offered by spatial finance are unprecedented, and the data it presents means financial institutions have a unique opportunity to capitalise on the benefits of these tools to successfully combine financial returns with sustainable outcomes.



Christophe Christiaen, Sustainable Finance Lead, Satellite Applications Catapult & Co-Founder, Spatial Finance Initiative

Christophe Christiaen started his career in corporate finance and then worked at the European Space Agency as a business analyst before joining the Satellite Applications Catapult's business strategy team. His role there supports the development of new applications.

FIELDS OF EXPERTISE

With our growing urban populations needing to find fresh ways to feed themselves, Infarm is using its innovative 'vertical farming' ideas to help cities become self-sufficient in their food production and to shorten supply chains. We ask co-founder Erez Galonska about his company and its plans.



Please tell us about the work you are doing with Infarm and its mission.

Infarm started in 2013, when my brother Guy Galonska, Osnat Michaeli, and I began experimenting with growing fresh produce. Having just moved to Berlin, we bought a 1955 Airstream trailer, fitted it with DIY growing shelves, and experimented with indoor farming.

Soon we began to build modular, vertical farming units that could be installed in any urban environment, including supermarkets, restaurants, distribution centres, and other urban spaces, as close as possible to where food is consumed. We now have more than 1,200 farms in supermarkets and

distribution centres around the world, harvesting more than 500,000 plants a month and growing.

For those unfamiliar with the idea, could you explain how vertical farming works?

In its simplest form, vertical farming is the process of growing fruits and vegetables in vertically stacked layers. This takes place in a controlled growing environment, often without soil but with light energy from LEDs to stimulate plant growth. Our approach allows us to be climate-independent and grow under any conditions. Our vertical farms can be installed directly in any urban space, which is where the majority of the global population will live in the next few decades.

FIELDS OF EXPERTISE 59

Why did you decide to focus on sustainable food production and provision?

It is becoming increasingly evident that we need to find a different way to feed our cities' growing populations. The solution is creating more resilient local food economies. This means shorter supply chains that are leaner, more accountable and more sustainable, and it means increasing cities' self-sufficiency by diversifying local food production. Knowing the huge environmental burden growing fresh produce places on our planet, we were determined to find a more efficient, sustainable way to feed our cities.

Many countries rely heavily on food imports rather than domestic production. Could their agriculture sectors be transformed by adopting urban farming?

As has been highlighted during the pandemic, the fragility of our global food supply chain is of great concern. Rather than relying on stretched, inefficient and environmentally damaging supply chains, we hope that urban farming can allow for greater self-sufficiency in our cities.

We are focused on the 'farm to table' idea – eating what is local to you ensures the method is not only sustainable, but also good for the environment. We want a model that is capable of delivering the technology, processes, and expertise to enable an entire ecosystem of partners – from distribution centres to food manufacturers, from schools to hospitals and beyond – to participate in making cities truly self-sufficient in their food production.

What do you ultimately hope to achieve with the company, and what environmental or societal effects will reaching your goals have?

Infarm was founded on a visionary mission: helping cities become self-sufficient in their food production while significantly improving the safety, quality, and environmental footprint of our food. Our ultimate vision is to feed the estimated 7 billion people living in urban centres by 2050.

Production of fresh produce is currently centralised in only a few climate zones, often with thousands of kilometres between farm and retailer. As a result, according to some estimates, food production and transportation is responsible for 15–20 per cent of all CO_2 emissions. Infarm grows its own fresh produce in future-proof, indoor farms under perfectly controlled conditions. We use 95 per cent less water and 95 per cent less land, and produce plants that are free of chemical pesticides and hyperlocal, making it healthy for consumers and the planet.

How has the development of Infarm benefited from technology, and how will it continue to support your expansion?

With an eye on the future, we're in the midst of an exciting moment in which there is a potential to combine the advances of the past 10 years, including Internet of Things, machine learning, image recognition, renewable energies and similar technologies, with advances in plant and agricultural sciences to create innovative, sustainable solutions in food distribution that will serve our planet for the next hundred years.

There has been substantial innovation in these areas from technologists in Germany, Europe, and around the world, and we expect the pace of innovation in these areas to accelerate. At Infarm, our goal is to be a key participant in, and contributor to, this evolution.

While using land sustainably for food production makes environmental and societal sense, why did you decide that Infarm made sense from a business perspective?

Being passionate about sustainability and the environment, we knew there was a growing demand for access to more sustainably sourced produce, as well as more transparency around its provenance and production. This has been reflected by retailers who are not only determined to satisfy this customer demand, but are also driven to improve their own environmental footprints.

Do you have any advice for investors or entrepreneurs who are looking to become involved with urban farming or sustainable food production?

Look for innovation that can drive impact at scale, that can be easily integrated within current infrastructures, and that can work in conjunction with other industries, to make a profound change.



Erez Galonska, CEO & Co-Founder, Infarm

Before co-founding Infarm in 2013, Erez Galonska spent over a decade exploring techniques for sustainable agriculture in farming communities. That led to the creation of the Infarm network that helps cities become self-sufficient in their food production, while improving the safety, quality, and environmental footprint of food.

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